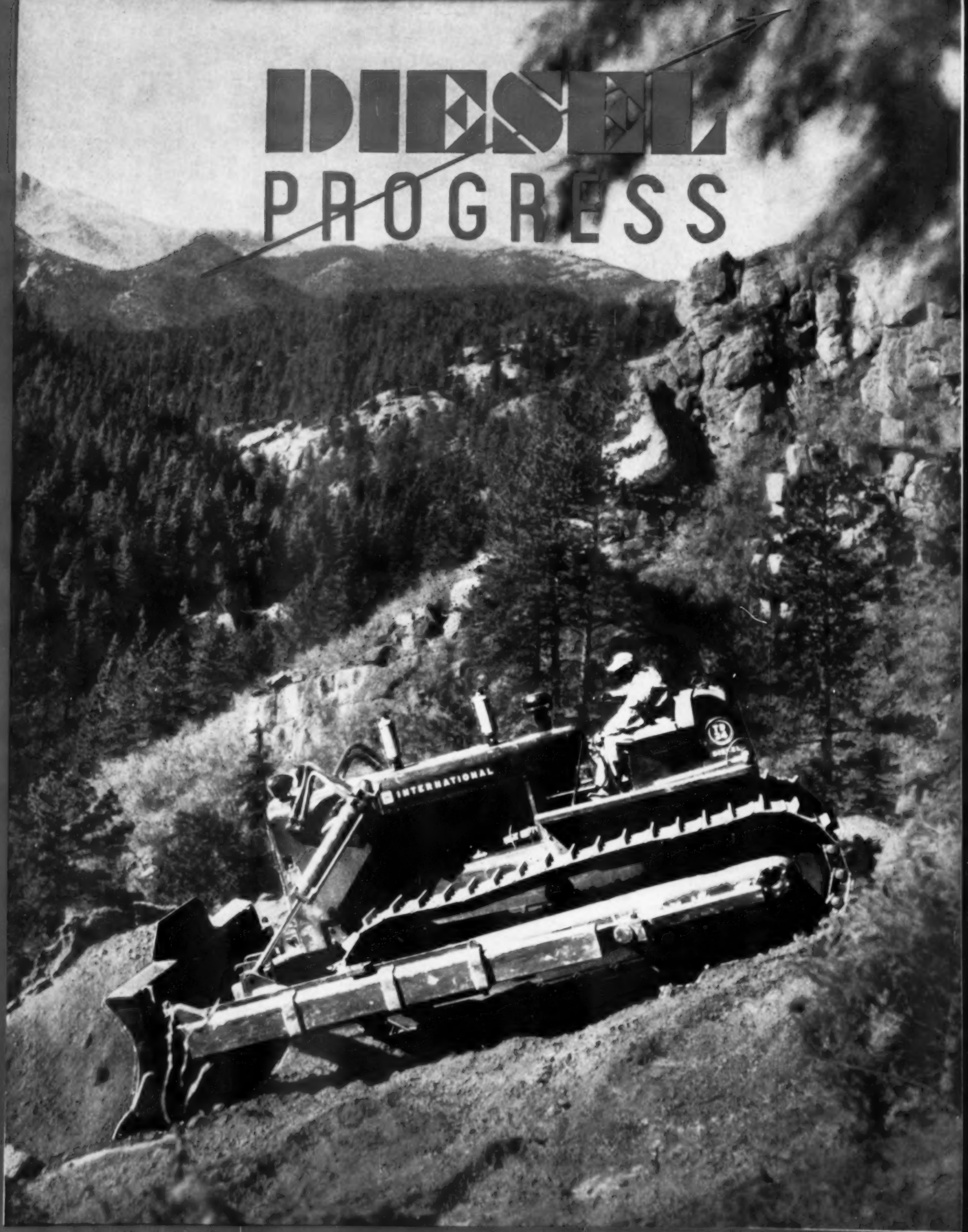
# DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR




FIVE DOLLARS PER YEAR

OCTOBER, 1955

FIFTY CENTS PER COPY

# GOOD EXAMPLE OF HIGH EFFICIENCY DIESEL OPERATION

**FEDERATED** Rural Electric Association, Jackson, Minnesota, ranked first in efficiency in 1954 among REA non-base-loaded plants — and third among all plants in the REA system. This, according to Robert A. Staten, Chief Engineer, is due to exacting maintenance procedure plus the use of *Texaco Ursa Oil Heavy Duty* for engine lubrication. As Mr. Staten puts it:

*"We keep a constantly watchful eye on our operating conditions and follow strict maintenance procedures. Texaco Ursa Oil Heavy Duty has done a wonderful job in backing us up. Overhauls unfailingly show engines clean — no deposits and all rings free. Wear is virtually unmeasurable. All this, of course, has helped us set our record for efficiency with low maintenance costs and minimum fuel consumption."*

*Texaco Ursa Oil Heavy Duty* is one of the complete line of famous *Texaco Ursa Oils* especially refined and processed to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls. These benefits, consistently delivered, are the reasons why —

**For over 20 years, more stationary diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.**

Let a Texaco Lubrication Engineer give you full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN . . .
TEXACO STAR THEATER
starring
JIMMY DURANTE
on television . . .
Saturday nights, NBC.

TEXACO

TEXACO

**THESE FOUR** Nordberg dual-fuel engines are all lubricated with *Texaco Ursa Oil Heavy Duty*. Three have been on the job since 1950 — the fourth, added in 1952, was Texaco-lubricated as a matter of course.

# URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

# Powerful

## *new partner for Pegasus*

PROUD new bearer of the Flying Red Horse is SOCONY 9, the fifth General Motors Diesel-powered tug in the Socony Mobil fleet.

This modern work horse is the latest step in Socony Mobil Oil Company's fleet modernization started in 1948. GM Diesel power has made that program pay off by reducing operating expenses, cutting maintenance and service costs and helping the company's tugs do more work per day.

Your local Cleveland Diesel Engine Division representative can show you the savings you'll make with GM Diesel power in your tugs. Call him today or write direct for more information.

GM Diesel-powered SOCONY 9, designed by the Socony Mobil Oil Company and built by the Baltimore Marine Repair Shops, Inc., Baltimore.

**CLEVELAND DIESEL ENGINE DIVISION**
General Motors • Cleveland 11, Ohio • Engines from 150 to 3300 H.P.

GM CLEVELAND DIESEL

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# DIESEL and GAS ENGINE PROGRESS

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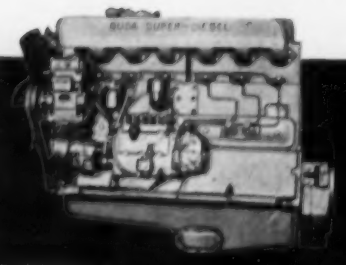
**FRONT COVER ILLUSTRATION**

An International TD-24 crawler works to prevent slides over the road going to the summit of famed Pikes Peak. Steep slopes don't phase the TD-24, one of the most powerful standard - transmission crawlers ever tested by the University of Nebraska.

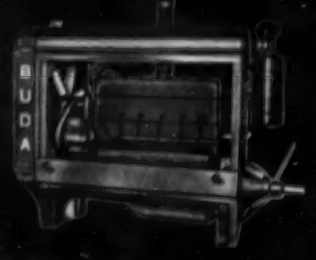
# ALLIS-CHALMERS

## in increased

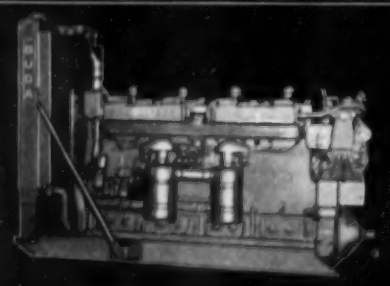
### *Specify or Install A-C*



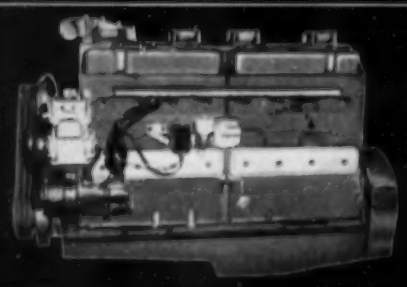
**DIESEL**
21 Models
9 to 516 HP



**GASOLINE**
12 Models
15 to 259 HP



**NATURAL GAS**
16 Models
15 to 465 HP



**BUTANE or PROPANE**
16 Models
15 to 500 HP

There are no "compromise" engines in the ALLIS-CHALMERS line. You can specify or install the *exact* type, size and fuel engine to fit any piece of construction equipment from a small pump to a giant dragline — and be sure you're getting the kind of power that pays off in more production and lower cost per horsepower hour of operation.

**SHOVELS**

Choose any of 65 basic models . . . 9 to 516 horsepower . . . select any type of fuel — Diesel, gasoline, natural gas, butane or propane — and you'll get a ruggedly built, workhorse that will run longer with less downtime and maintenance than any other engine.

ALLIS-CHALMERS power is *the* answer to today's demands for more power for more production, better performance and longer life.

*Before you buy or specify any engine . . . GET THE ALLIS-CHALMERS POWER STORY! Your nearby ALLIS-CHALMERS Buda Division Distributor has facts and figures that will interest you. See him soon.*

# POWER PAYS OFF

## production in any equipment

***Diesel, Gasoline, Natural Gas, Butane or Propane Engines***

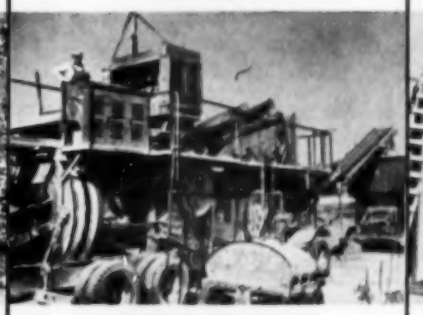
## *for MORE WORK at LESS COST!*

**TRACTORS**

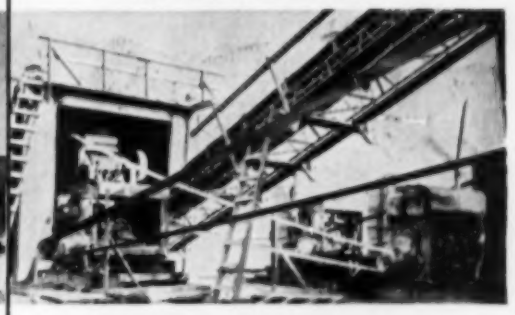
**DRAGLINES**

**MOTOR SCRAPERS**

**HAULAGE UNITS**

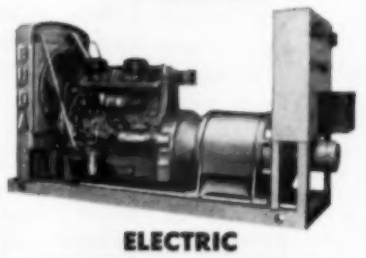


**CRUSHERS**



**QUARRY EQUIPMENT**

**COMPRESSORS**



**ELECTRIC GENERATING PLANTS**

*Write for more information on ALLIS-CHALMERS Power for construction equipment.*

# ALLIS-CHALMERS

**BUDA DIVISION, HARVEY, ILLINOIS**

**higher loads...**
**economy fuels...**
**new**
**engine designs...**

*there's one answer for all three of these lubrication problems—*

Demands upon the lubricant in stationary industrial engines are increasing. More severe operating conditions caused by heavier loads, new engine designs and the use of economy fuels pose difficult lubrication problems not met by conventional oils. Standard Oil Company introduces a lubricant specifically designed to meet these problems—STANODIESEL Oil M.

# STANODIESEL OIL M

STANODIESEL Oil M meets or exceeds the requirements of a lubricant for stationary industrial engines. Here's why:

STANODIESEL Oil M is refined from the highest quality base stock. It has superior stability.

Special additives are blended with this STANODIESEL Oil M base stock. An oxidation inhibitor prevents unwanted increases in oil viscosity and prevents corrosion of bearings. The action of detergent-dispersant additives keeps crankcase, pistons, cylinder walls and other parts clean. Contaminants are kept in suspension and are prevented from depositing. An anti-foam agent makes this oil suitable for use in hydraulic governors. A wetting agent increases the oil's ability to reach and maintain a film on such highly stressed parts as cams and cam followers.

Use of STANODIESEL Oil M means this: less engine deposits, less ring and cylinder wear. Less spark plug fouling when used in gas engines. Eliminates fuel injector and pump sticking caused by deposits on the injector barrel and plunger when fuel and lubricating oil commingle.

You need to know about STANODIESEL Oil M. In the Midwest, call your nearby Standard Oil lubrication specialist. You will receive the information promptly. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (Indiana)

# PlainFacts...

TELEPHONE
ORchard 3-8282

CABLE ADDRESS
DAROCOOK-SKOKIE

D. D. COOK
*President*

DAROS AMERICAN CORPORATION

8128 NORTH LAWNDALE AVENUE
SKOKIE, (CHICAGO SUBURB) ILL., U.S.A.

DEAR MR. ENGINE OPERATOR

The cost of fuel represents 50 to 65% of the total cost of your engine operation. Piston ring leakage increases fuel cost 10 to 15%. This WASTE is not necessary—

Renewal or reboring worn cylinders can be postponed thousands of operating hours. Sealing rings are available that stop all leakage in worn cylinders.

Operating time between ring renewals can be increased 100 to 500%, reducing your maintenance expense.

Cylinder and ring wear can be reduced 50 to 90%, depending upon your selection of piston rings made of wear resisting material.

Daros make piston rings designed to correct these conditions, using special material and design needed for each type ring.

CAN YOU AFFORD TO IGNORE THESE FACTS?—

ONE DAROS INSTALLATION WILL CONVINCE YOU

Very truly yours,

D. D. Cook

EXCLUSIVE WHOLESALE DISTRIBUTORS IN NORTH, CENTRAL AND SOUTH AMERICA
DaRoS PISTON RINGS — DaRoS METALLIC ROD PACKINGS — DaRoS CYLINDER LINERS
MADE OF WORLD-FAMOUS SWEDISH CHARCOAL IRON BY
AB. DAVY ROBERTSONS MASKINFABRIK, GOTHENBURG, SWEDEN
ORGANIZED 1851

*(This is one ad in a series designed to tell Diesel Operators the important story about DaRoS Swedish Iron Piston Rings.)*

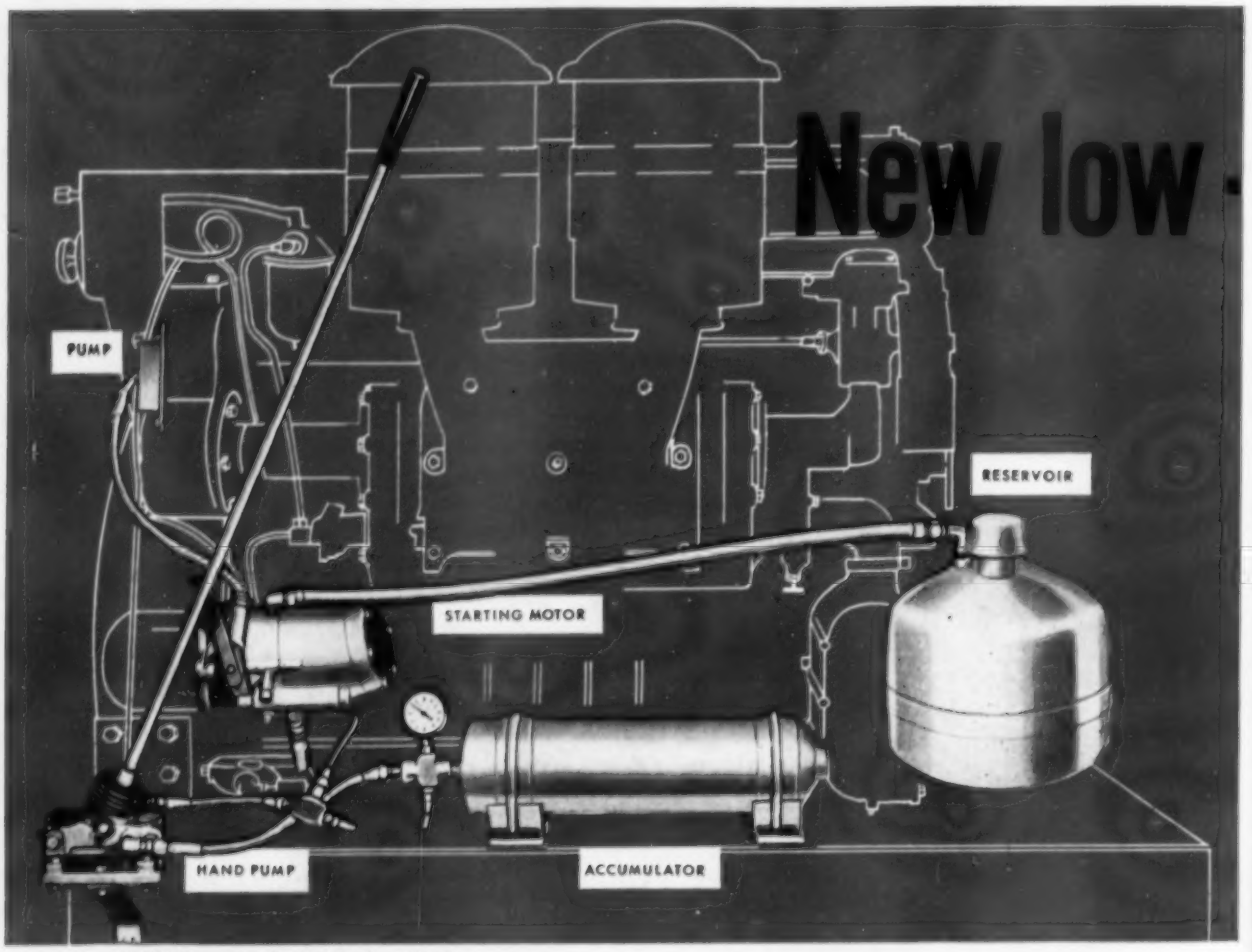
DaRoS American Corporation
8128 N. Lawndale Ave., Skokie, Illinois
Gentlemen: Send me complete information on DaRoS Rings.

NAME_____

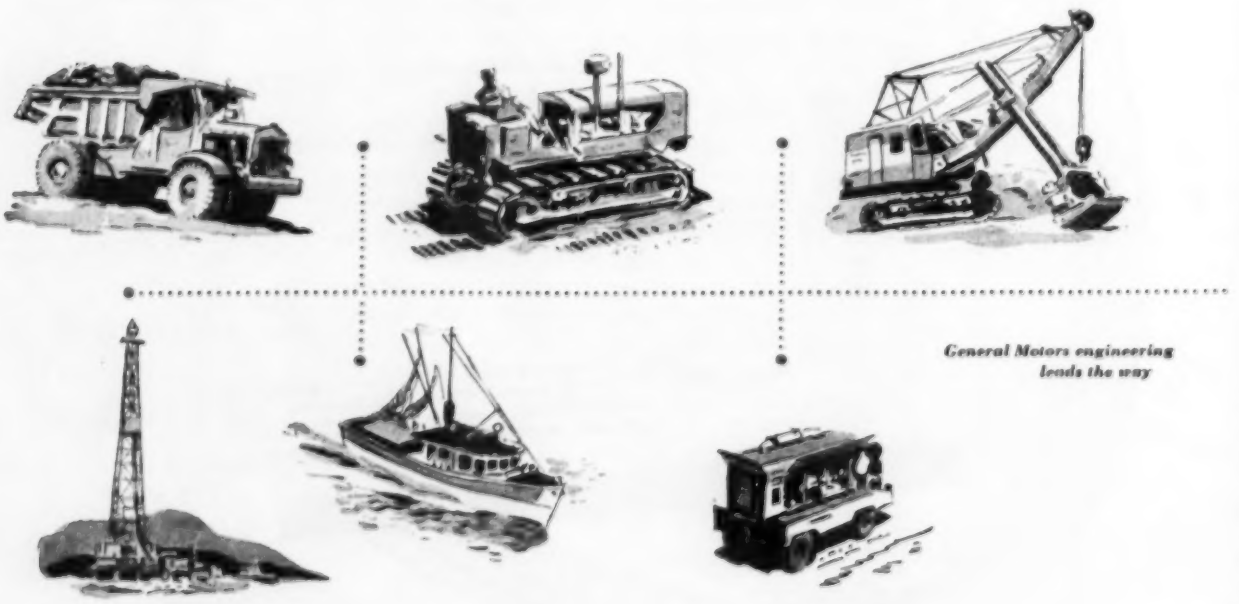
FIRM NAME_____

STREET ADDRESS_____

CITY_____ STATE_____




**NEW Aeroproducts Hydrostarter** brings quick, sure, safe starting to Diesel engines in all kinds of weather. It frees Diesel operators from battery replacements, costs less than any other nonelectric Diesel starting system.



*General Motors engineering leads the way*

# ·cost Diesel Hydrostarter

## *For positive all-weather starting*

Now you can start your Diesel engine quickly in any kind of weather with the new Aeroproducts Hydrostarter – the hydraulic starting system that replaces regular starters.

It spins a Diesel twice as fast as battery-operated starters, has no parts or components that require regular replacement, costs less to operate than electric starting systems.

It fits any Diesel engine up to 300 horsepower, lasts the life of the engine on which it is installed.

And it sells for a far lower price than any other nonelectric Diesel starter available today.

### Easy to install—simple to maintain

Your Diesel engine dealer or equipment distributor can quickly install the Aeroproducts Hydrostarter on your Diesel. The system is so simple that his mechanics—or yours—can do the job with no special training. And all it takes is a few hours' time for installation.

With a Hydrostarter on your Diesel your maintenance costs will drop, too. It's completely self-contained—routine maintenance checks are all the care it needs.

### How the Hydrostarter works

Heart of the system is a hydraulic starting motor operated by high-pressure fluid. Pressure is built up and maintained by an engine-driven pump in a piston-type accumulator.

A simple control lever admits this high-pressure fluid to the starting motor, spinning the engine. This control lever also completely engages the starting motor's gears with the Diesel's flywheel before operation.

The hand-operated pump is provided to turn over the Diesel slowly for mechanical adjustments. It also is available to raise pressure if needed. The working fluid is stored and filtered in a reservoir.

### See your dealer or write today

If you want quick, sure starts for your Diesels, ask your engine or equipment dealer about the new Aeroproducts Hydrostarter. He can give you full information—or quickly get it for you. If you prefer, fill in the coupon or write direct for more information.

GM GENERAL MOTORS

*Building for today...Designing for tomorrow*

*Aeroproducts*

ALLISON DIVISION OF GENERAL MOTORS
DAYTON, OHIO

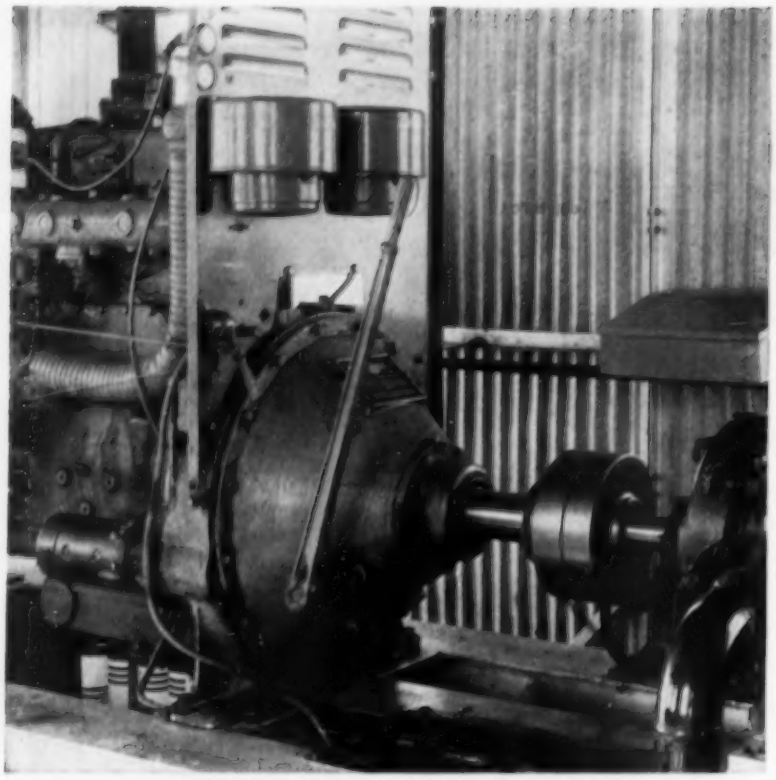
Please send me full information on the new Hydrostarter.

NAME_____

POSITION_____

COMPANY_____

ADDRESS_____



Twin Disc Friction Power Take-Offs are provided in single-plate 6.5" to 24"; double-plate 11.5" to 24"; triple-plate 14" and 18". Housing sizes No. 6 SAE to No. 00 SAE. Capacities to 650 hp. Typical installation shown is on a Waukesha gas engine. **Request Bulletin 129-C.**

# Known by the power it applies

To both the engine manufacturer and user, the power take-off—connecting driving and driven equipment—is one of the most critical components in the driven line. Here is the vital link where all horsepower and torque must be transmitted before any work is accomplished . . . a link which can become a costly "Achilles" heel through failure on the job.

In specializing exclusively since 1918 in the design, manufacture and application of industrial drives for powered equipment, Twin Disc has developed Friction Power Take-Offs that assure trouble-free operation throughout the working life of machines to which they are applied. Designed for superior performance, they are backed for their lifetime with unparalleled service.

*That's why the Twin Disc Power Take-Off is known by the power it applies.* Throughout industry, you see them behind engines built by the world's leading manufacturers . . . for both manufacturers and users know *this* Power Take-Off will never become an "Achilles" heel on the job, to either operation costs or production schedules.

TWIN DISC

**TWIN DISC**

*Friction Clutches and Fluid Drives*

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Seattle • Tulsa

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ALLIS-CHALMERS

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MM MODERN MACHINERY

MURPHY DIESEL

P&H

Superior

Waukesha MOTOR

WISCONSIN ENGINES

WITTE

All trade marks shown above are Reg. U. S. Pat. Off.

# new safety new convenience in Generator Switchgear

## *New E-M Swing-Door Instrument Panel*

● Take a good look at this new Swing-Door Instrument Panel on E-M Generator Switchgear . . . switchgear with a panel mounted on hinges, opening as a door to expose rear of panel and switchgear interior. Briefly, here are its advantages:

**1. SAFER, FASTER TESTING:** You can test with greater safety than ever before! No more stretching across busses to reach components. Instruments and protective relays are mounted on the Swing-Door for accessibility.

**2. SAFER, FASTER REPLACEMENTS AND CHANGES:** New location of fuses makes it possible for you to replace them quickly with complete safety. You have easy access to all parts . . . control circuit connections, selector switches, relays, and others.

**3. CLEANER, NEATER ARRANGEMENT:** Notice how the back side of the Swing-Door is utilized to fullest advantage for mounting and connections. A special mounting panel on the inside can carry fuses, voltage regulators, transformers, relays, resistors, etc. This extra space makes it possible to spot every component in the most accessible location.

In addition, the new E-M Switchgear shown above features handy draw-out air breakers which may be racked for quick disconnect or complete removal. Large 6-inch instruments are spotted high on the panels for easy reading. And you'll find that E-M Switchgear frames are permanently rigid . . . gusset-plate construction is used throughout.

This new Swing-Door Panel is typical of E-M's "extra value" Switchgear engineering. Each job is engineered and designed individually to meet your most exacting specifications. All E-M Switchgear is completely assembled and tested at the factory . . . it's ready to install.

Ask your nearest E-M sales engineer to give you full information on E-M Switchgear with the new Swing-Door Instrument Panel.

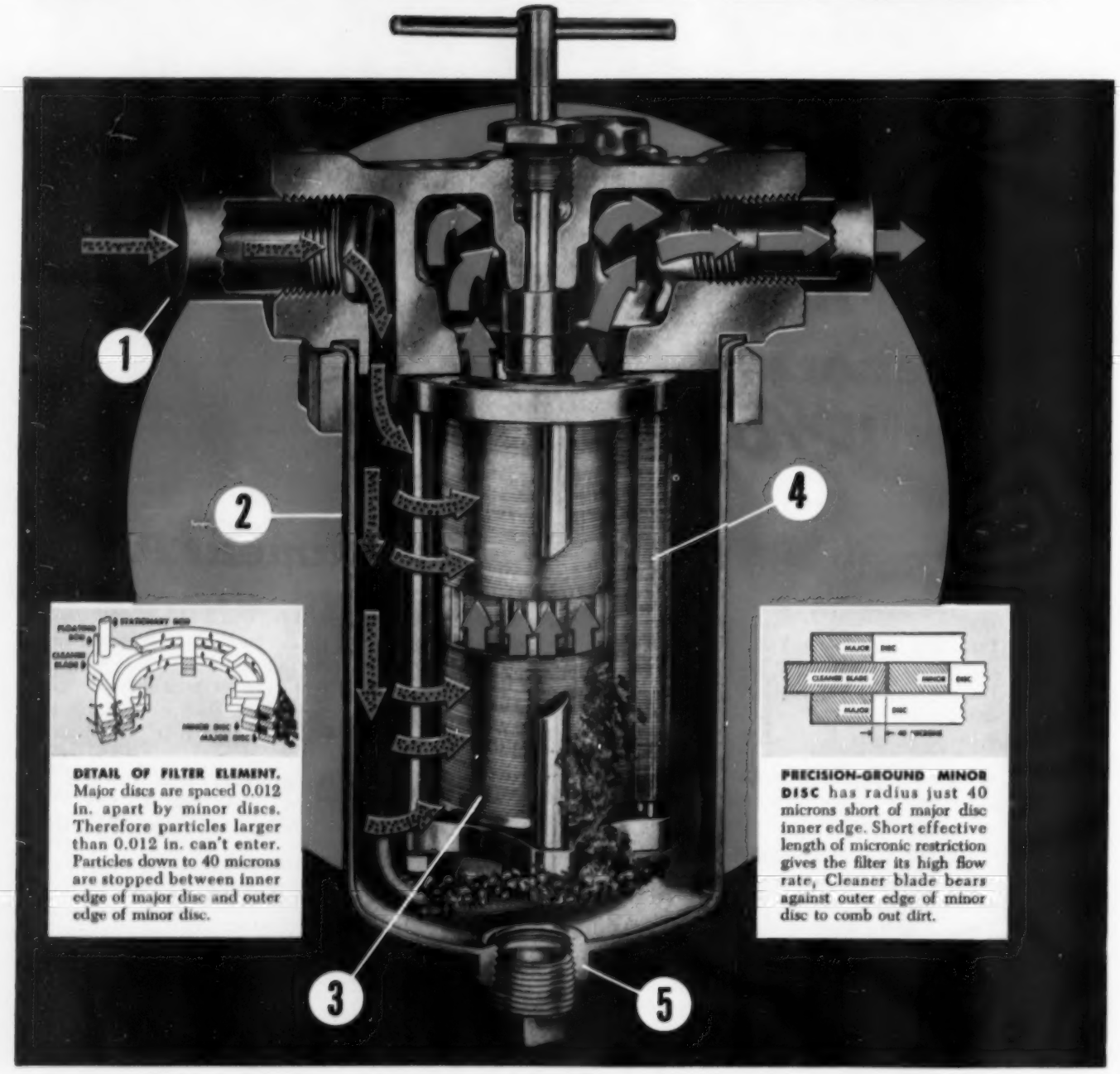
ELECTRIC MACHINERY MFG. CO.
MINNEAPOLIS 13, MINNESOTA

4200-TPA-2130

E-M

*Specialists in*
**MODERN SWITCHGEAR DESIGN**

# New CUNO 40-micron






**DETAIL OF FILTER ELEMENT.** Major discs are spaced 0.012 in. apart by minor discs. Therefore particles larger than 0.012 in. can't enter. Particles down to 40 microns are stopped between inner edge of major disc and outer edge of minor disc.



**PRECISION-GROUND MINOR DISC** has radius just 40 microns short of major disc inner edge. Short effective length of micronic restriction gives the filter its high flow rate. Cleaner blade bears against outer edge of minor disc to comb out dirt.

**CUTAWAY OF NEW SUPER AUTO-KLEAN.** Dirty oil enters inlet (1) at left, fills housing (2) and flows through metal-edge filter (3) of stacked major and minor discs. Trapped dirt is combed out by cleaner blades (4) when discs are rotated and is removed through drain (5). Clean oil rises through center of filter element, leaves at right.

# self-cleaning filter!

## THE *Super* AUTO-KLEAN

### FOR FULL-FLOW LUBE AND FUEL

. . . and you can clean this filter by simply turning the handle!

Cuno's new Super AUTO-KLEAN filter now makes possible economical, compact full-flow micronic filtration for small high-speed diesels, and requires no more space than present bypass filters. Super AUTO-KLEAN makes full-flow filtration on large low-speed diesels more economical than ever before. Here's what it offers:

**1.** Full-flow micronic filtering with a self-cleaning filter. Filter can be cleaned continuously with motor drive or intermittently by manually turning handle.

**2.** Eliminates cartridge changes.

**3.** No pressure drop build-up (saves pumping horsepower). An 8-in. long, 2¾-in. diameter cartridge handles 25 gpm of lube oil of 200 SSU viscosity with only 3 psi pressure drop—up to 75% more with slightly higher pressure drop.

**4.** Positive engine protection against particles larger than 40 microns (actually 0.0015 in.). Filter can't rupture or channel.

**5.** No need to use large, expensive, high-maintenance cartridge filters. Oil can be kept in top shape with small, inexpensive bypass CUNO MICRO-KLEAN filter to remove particles smaller than 40 microns. Bypass cartridge lasts longer because it's not clogged with particles larger than 40 microns.

**6.** No duplex units needed. Super AUTO-KLEAN handles full flow all the time with no interruptions for cleaning.

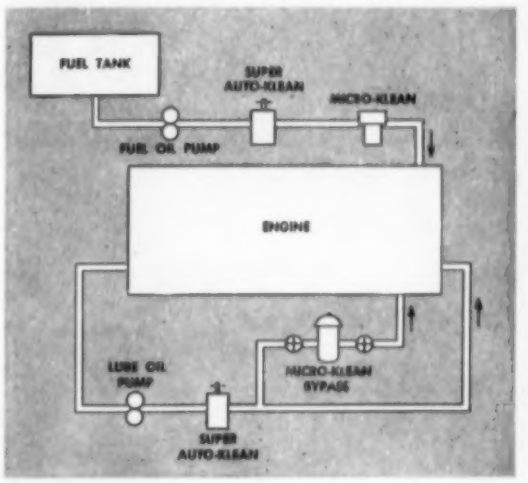
**7.** Can't absorb or adsorb additives from the oil because it's all metal.

**8.** Uses standard AUTO-KLEAN housing on existing AUTO-KLEAN installations. You can easily replace most 2¾-in. diameter cartridges with Super AUTO-KLEAN for finer filtration.

**9.** Can be adapted to any existing engine. Simply install Super AUTO-KLEAN in the full-flow lube oil line following the discharge of the engine pump.

**10.** Gives lower initial costs, lower installation costs, requires less space than cartridge-type full-flow units. You get high capacity in a small package.

Send coupon for complete information on the new Super AUTO-KLEAN filter for your new or existing diesels. Cuno Engineering Corporation, Dept. 8151, South Vine Street, Meriden, Conn.




**SIMPLIFIED SET-UP** for ideal lube oil filtration. Full flow goes through Super AUTO-KLEAN and is cleaned of particles 40 microns and larger on every pass. A CUNO MICRO-KLEAN replaceable-cartridge filter may be used where conditions warrant further clarification. Various element densities available to remove particles down to one micron. Housings available for either partial flow (as shown above) or full-flow hook-ups.

S.1

***MAIL COUPON FOR COMPLETE INFORMATION***

CUNO

## *ENGINEERED FILTRATION*

**Removes More Sizes of Solids from More Kinds of Fluids**

**AUTO-KLEAN (disc-type) • MICRO-KLEAN (fibre cartridge)**
**FLO-KLEAN (wire-wound) • PORO-KLEAN (porous metal)**

CUNO ENGINEERING CORPORATION
**Department 8151**
**South Vine Street, Meriden, Conn.**

**Please send me full data on the NEW Cuno Super AUTO-KLEAN filter.**

Name_____

Firm_____

Position_____

Address_____

City_____ Zone_____ State_____

# The Engineer's Field Report

CASE HISTORY

LUBRICANT RPM Delo Oils

FIRM Nelson Logging Co., Twain Harte, Calif.

## Trucks work 4 years with no lost bearings on tough, high-mountain logging job!

In hauling 25-ton payloads out of the Sierra Nevada Mountains, Nelson Logging Co.'s 10 International trucks like the one above operate in lower gears more than half the time—often in low and compound low. Using RPM DELO Special Lubricating Oil, they have not had a single bearing failure in four years of tough service where mountain roadbeds always are either deep dust or heavy mud and snow. Bearings above show typical good condition after three years of this rugged work. "We get an average of 3 years service from piston assemblies in our trucks," says Slim Meissen, Master Mechanic. "'RPM DELO' keeps all our engines clean, rings free and wear exceptionally low." Nelson Logging Co. uses RPM DELO Oils in all equipment—the 10 logging trucks, 11 other gasoline-powered units, 6 diesel tractors and a loading crane.

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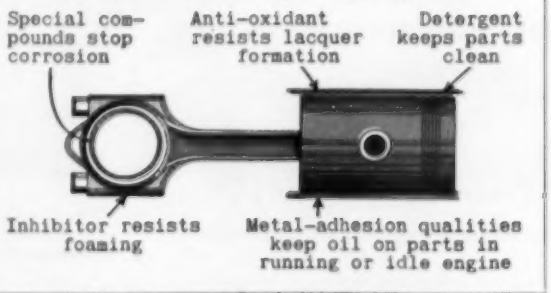
TRADEMARK "RPM DELO" REG. U. S. PAT. OFF.

### Why RPM DELO Oils prolong engine life


Special compounds stop corrosion
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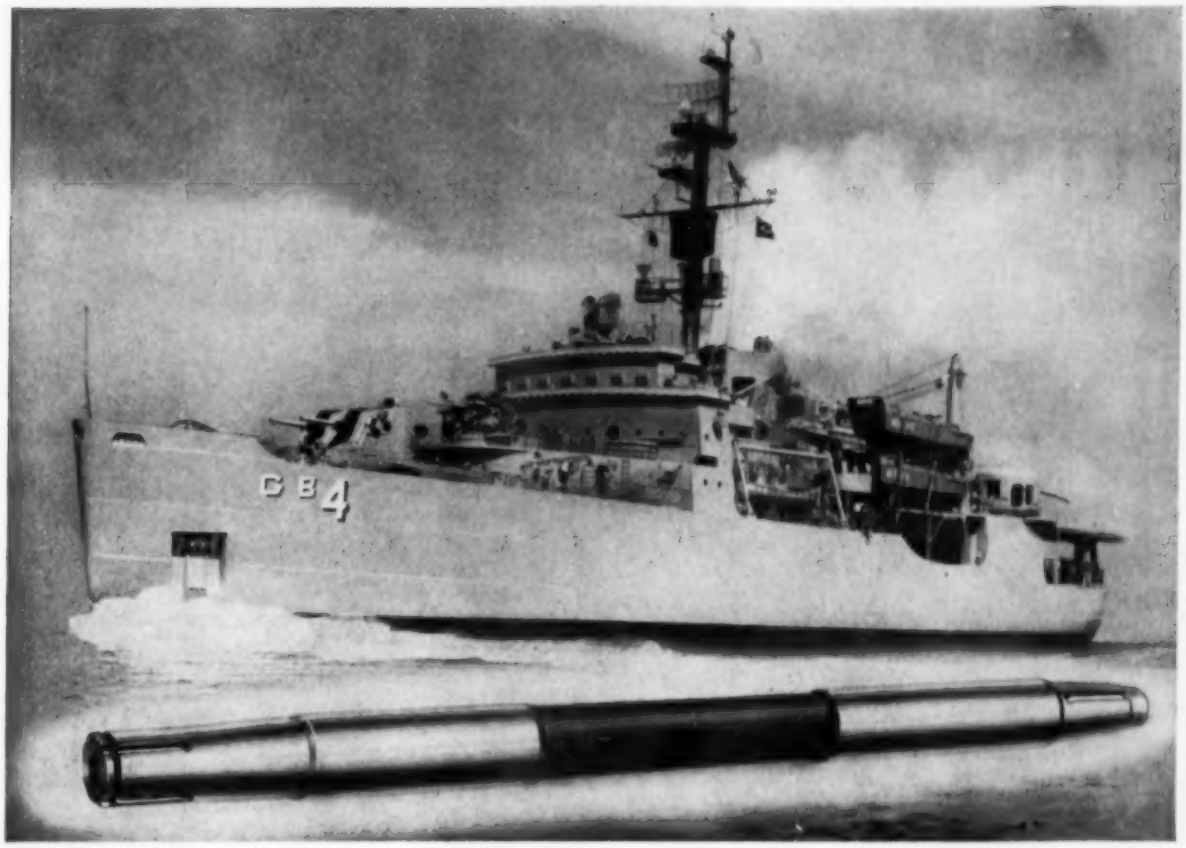


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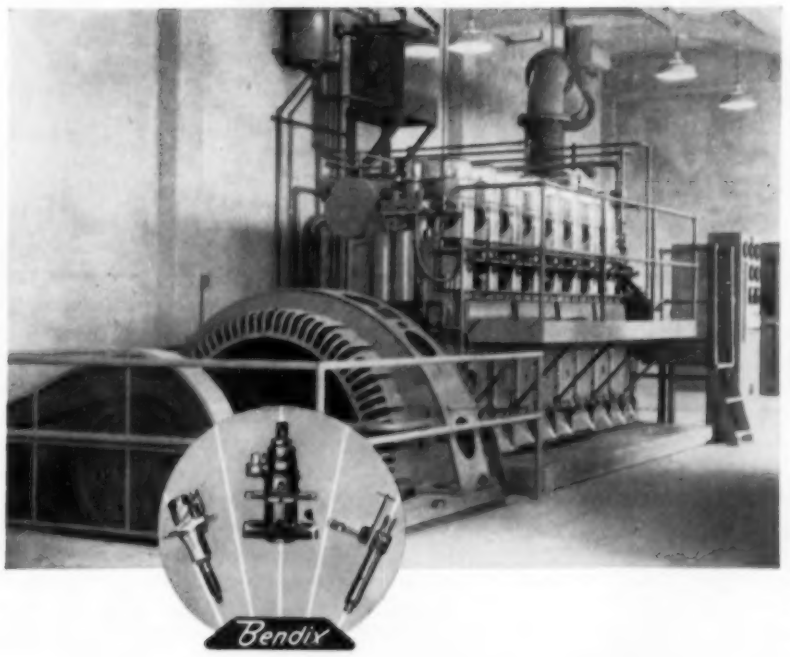


Providing emergency lighting facilities for the vast, new San Francisco International Airport is no small task. Add to this the job of powering pumps connected to the field's drainage system, in case of floods, and you have still another chore that takes on herculean proportions. Yet, the Enterprise Diesel Generator with Bendix* Fuel Injection Equipment, set for standby duty at this modern new airport, is prepared to handle either of these functions!

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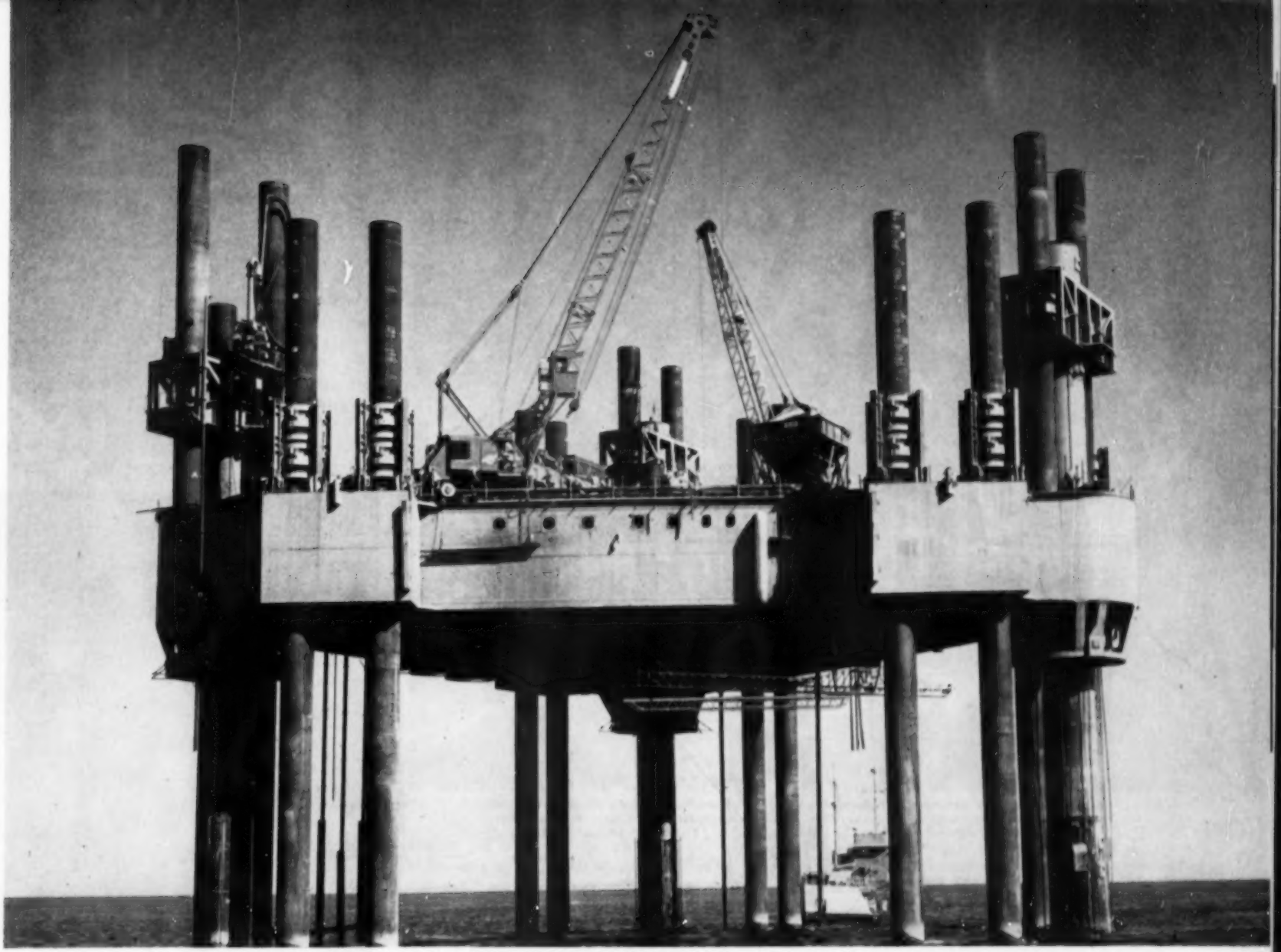


First of the "Texas Towers," under construction off Cape Cod. Eleven Cummins diesels are a part of the defense installation—nine on generators and two in Manitowoc cranes. Most legs shown are temporary; only three will support platform when completed. Coast Guard vessel was standing by to take off workmen when hurricane threatened.—*Photo by Gordon Converse, courtesy of "The Christian Science Monitor."*

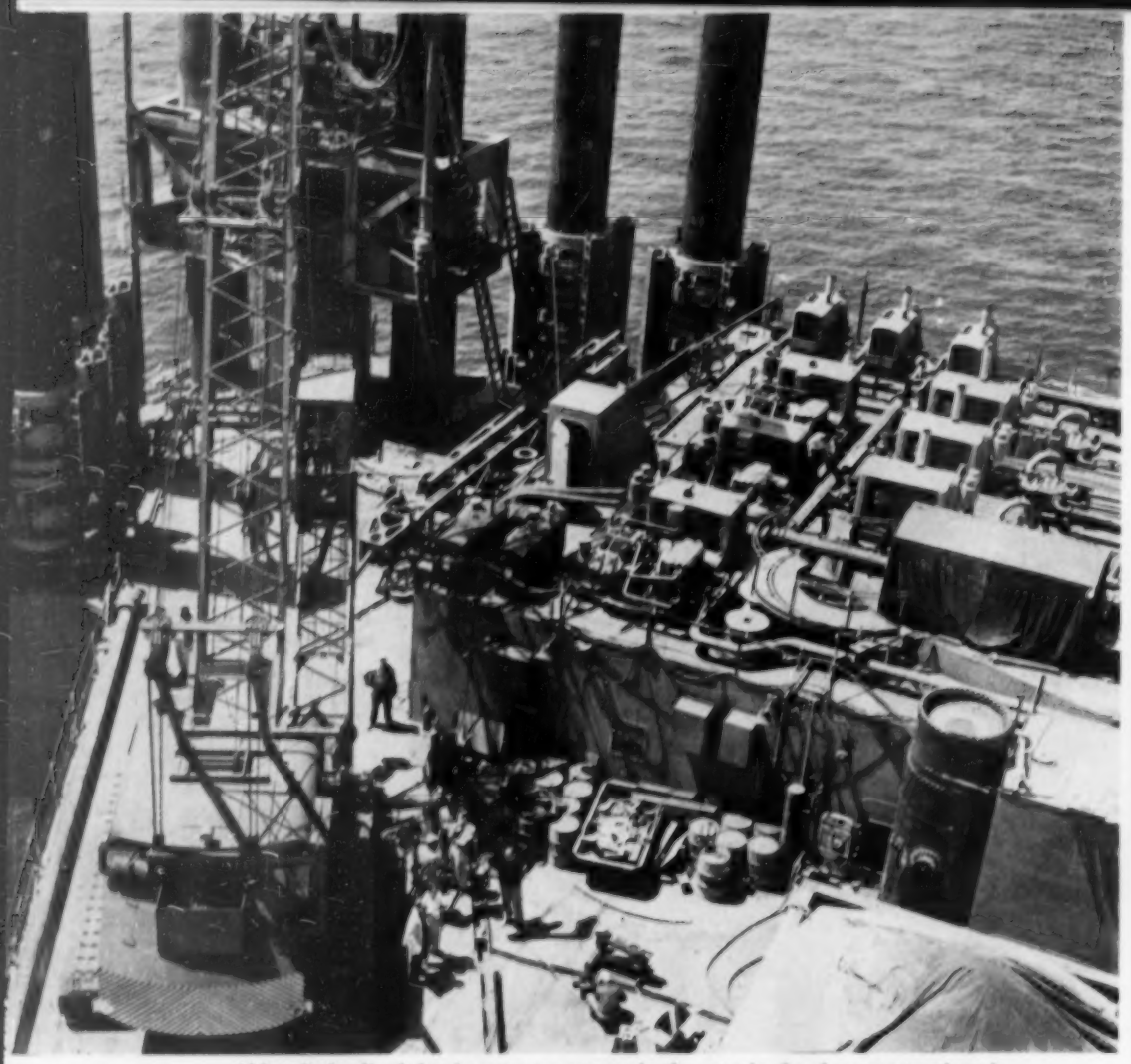
# RADAR ISLAND POWERED BY DIESELS

*By* MARK OGDEN

ELEVEN diesel engines are a part of the permanent equipment on the first of the radar islands now being erected by the Defense Department in the Atlantic Ocean about 100 miles east of Cape Cod. Eight engines turn 100-kw generators to provide electricity for radar and radio installations and for ship's service; a ninth engine powers a 40-kw auxiliary generator; and two other engines are in giant, specially-designed cranes. The radar island, nicknamed "Texas Tower" because it incorporates some of the features of the offshore drilling platforms in the Gulf of Mexico, provides further proof that scientific advancement creates new uses for diesel engines more often than it eliminates the need for such power.

The man-made islands will serve three useful purposes. Primarily they are detection installations to warn of surprise attack. Actually, they will be a close-in extension along the eastern coast of North America of the Distant Early Warning stations (DEW line) in the Arctic. (See DIESEL PROGRESS, June, 1955, pages 40-43 and September, 1955, pages 31-33.) The presence of the islands will supplement, and reduce somewhat, air and surface patrols operated off the coast. A second important function of military personnel on the islands will be to observe and report weather information. And the huge platforms will serve as navigational aids, enabling air and surface navigators to make electronic and visual fixes. The ultimate number of "Texas Towers" has not been made public, but it is believed there will be four or five more and that they will extend from off the Virginia coast northward to Brown's Bank, some 100 miles south of Novia Scotia.

The first of the islands was built in Bethlehem Steel Corp.'s Fore River yard at Quincy, Mass. Construction was under the supervision of the Navy's Bureau of Yards and Docks, but the islands will be manned by the Air Force. In July, two tugs towed the island from Quincy to its permanent location on the continental shelf off Cape Cod. Construction crews then worked swiftly to get the island firmly planted on its sea legs before the hurricane season arrived. However, "Connie's" early appearance caused some alarm. Despite the Weather Bureau's alert, most of the workmen elected to stay on the job rather than be taken ashore by the Coast Guard. The fact that the radar island already was a sturdy



Although the diesel-electric generator sets are in the open in the above construction picture, they will be under cover when radar island is completed, as indicated by the model, pictured at right.—*Photo by Gordon N. Converse, courtesy "The Christian Science Monitor."*

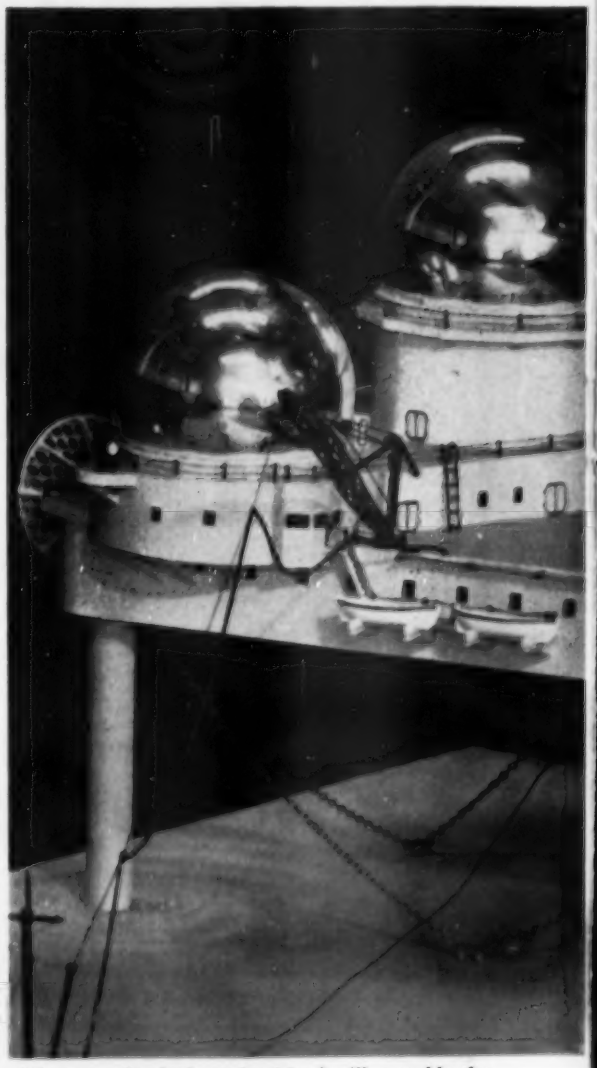
structure and that pay averaged $300 a week may have had something to do with their bravery. Erection work is being done by the Delong Corp. and the Raymond Concrete Pile Co., both of New York, who are to finish during November.

The island is triangular in shape, each side being 200 ft. long. A leg, 10 ft. in diameter, will support each corner. Twelve temporary pilings,—used to hoist the platform off the water after it was floated to location and to support it until the permanent legs are ready to take the stress—will be removed in the final phase of the construction. No pillars will protrude above the island when the job is finished.

The permanent legs are about 150 ft. long and will be forced some distance into the ocean floor. The water is 50 ft. deep at this point, and the platform will be 83 ft. above the water. The permanent legs are cylindrical metal tubes which will be filled with reinforced concrete. They will support the 6-to-8000-ton platform without cantilevering. However, it is understood that subsequent radar islands, placed in deeper water, will have cross-bracing between the legs.

Protection of these structures against the severe corrosive action of seawater presented designers with a major problem. It was determined that painting, combined with cathodic protection, would be ample for all surfaces excepting those at the tidal and spray levels. In this critical area, specifications called for a 35-ft. length of Lukens 10% Monel-clad steel the same thickness as the balance of the metal portion of the columns. Also, along the outer circumference of the sheathing, designers incorporated pure Monel buffers to protect against floating objects which might surge against the piling.

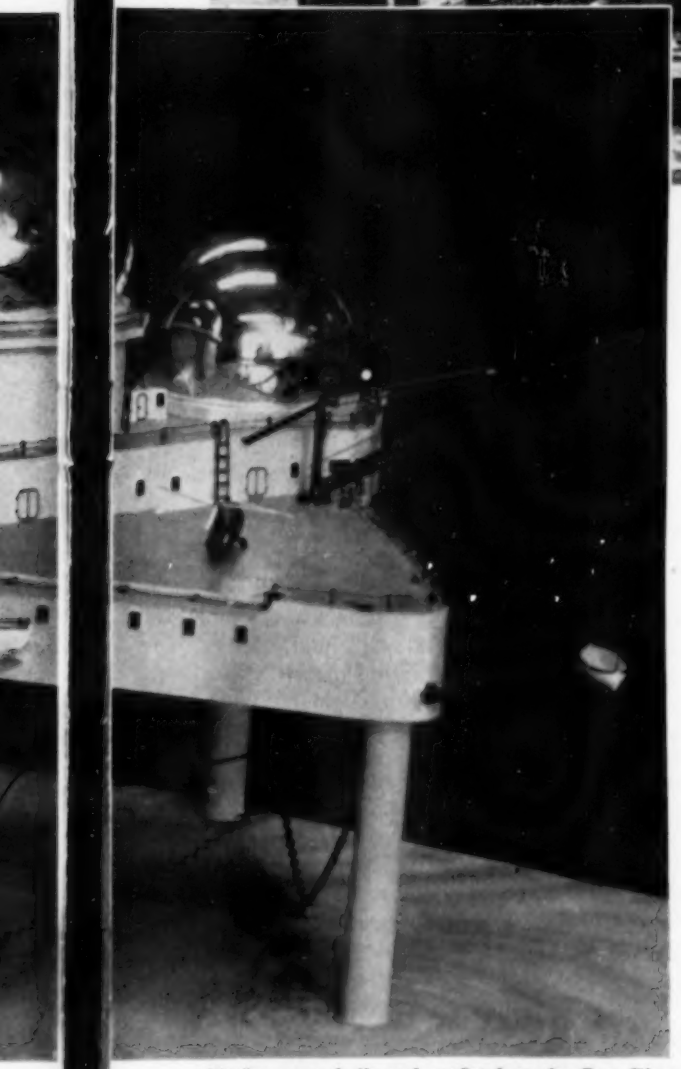
The space between the first and second decks is 20 ft. high, and most of the living quarters will be located therein. Accommodations will be provided for about 80 officers and men. However, it is believed that the number of technicians and others required to man the island will be nearer 50 in number. A deck house will be built across one side to house the diesel-electric generators, electronic equipment and other machinery. Atop this superstructure will be three radar domes. The deck in front of the superstructure will be free of obstructions so it can serve



When completed, the radar island will resemble the model above. Note helicopter on deck, legs under three corners only, and method for taking fuel from a surface craft.

The Boston sky line shows in the background as the first radar island is towed to its site in 50 ft. of water on the continental shelf. Construction methods which make it possible to float the platform and then jack it up on legs to 83 ft. above the water were perfected in building offshore drilling rigs. (See pages 36-37, DIESEL PROGRESS, July 1955.)

**Built under supervision of the U .S. Navy's Bureau of Yards and Docks, the man-made island will be staffed and operated by the U. S. Air Force. Essentially for detection of enemy bombing attacks, it also will serve as a navigational aid, and will collect weather information.—*Official U. S. Navy Photograph.***



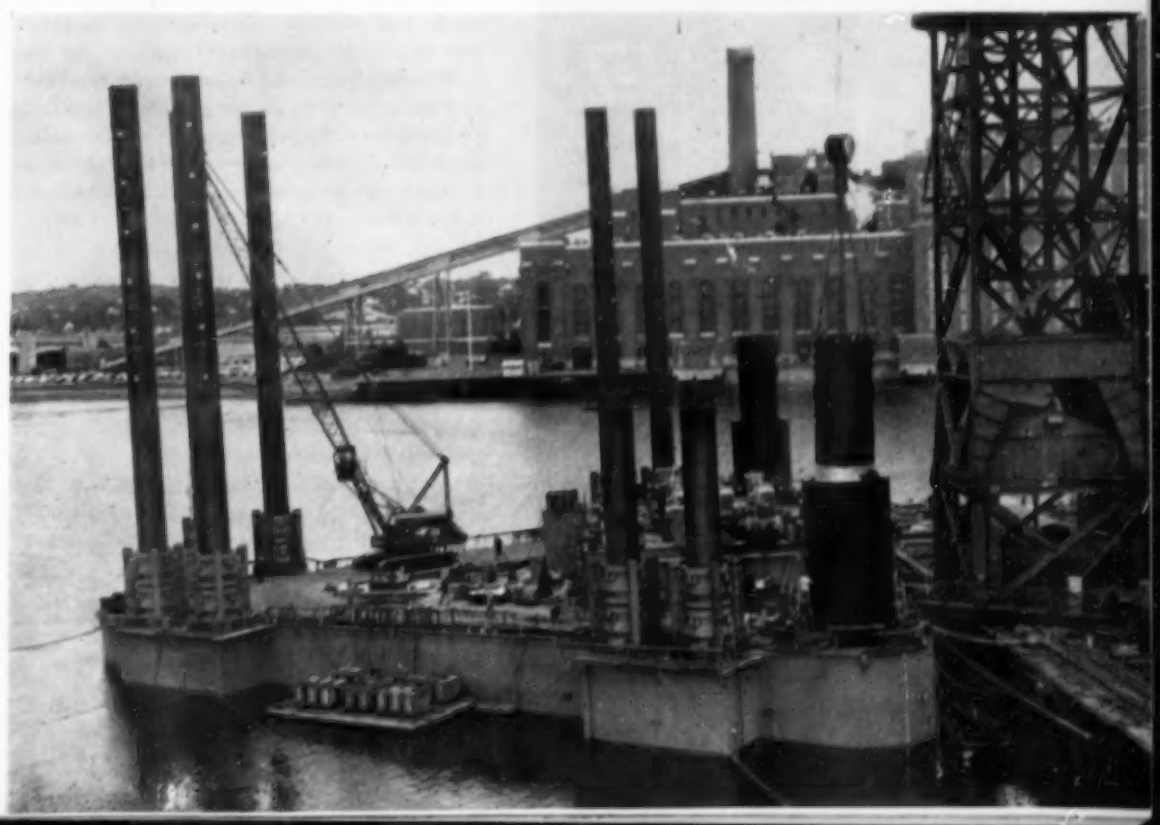
**Platform was built and outfitted at the Fore River yard of the Bethlehem Steel Co., Quincy, Mass. Note size and location of permanent legs in comparison with the smaller temporary legs. Although only one Cummins-powered Manitowoc crane is shown here, the island will be equipped with two of them.**

as a helicopter landing. The big cranes will be on opposite sides of the structure to load and off-load supplies, machinery and personnel moved to and from land by surface craft.

The eight diesels that turn the 100-kw generators are the "medium speed" (normally 1000 rpm) six-cylinder Cummins engines, Model LGA-100. The Cummins factory built up the units, using generators obtained from the Burke Electric Division of Marathon Corp. Cummins Diesel of New England, Inc., built up the lone 40-kw auxiliary generator set, using a 4-cylinder Model HRCGA diesel engine and an Electric Machinery Co. generator.

The two big dieselized Model 3900-B 80-ton capacity cranes were built especially for this duty by Manitowoc Engineering Corp. Each crane is powered by a 6-cylinder, supercharged, 300-hp Cummins diesel, Model NHRIS-600. The engines drive through Torcon hydraulic torque converters. The operator's cab is on an extension above and forward of the crane's machinery compartment in order to give the operator maximum visibility. With 120-ft. booms, the cranes easily can reach far out and down to load and unload the smallest of vessels that call at the island. Both the top and butt sections of the boom are 35 ft. long. The jibe is 20 ft., and there is a 30-ft. special insert.

The radar islands cannot be built far enough from the coast to give more than a few moments of warning should an aerial invasion come at the supersonic speeds expected of enemy bombers in the near future. However, it is quite likely that the islands' electronic equipment will be fitted into a fire control system for the guided missiles that are counted upon to decimate the ranks of attacking bombers. Whatever heroic deeds the Texas Tower crews may be called up to perform to defend the nation against storms or bombers, it is comforting to know that the power source upon which their effectiveness depends is diesel.



# THE M. A. N. "WHISPER ENGINE"

## Dr. J. S. Meurer, a German Engineer, Challenges Tradition With a Revolutionary Injection System That Has Captured the Attention of the Entire Diesel Industry

*By* DEXTER CRAIG

STARTLING results in diesel operation have been achieved by a German engineer who dared to fly squarely in the face of tradition to develop a new combustion system. Quietness of operation never before attained, while producing normal horsepower output, little smoke, remarkable tolerance for different kinds of fuel and excellent economy are the results. And, due to its quiet operation, the new engine, produced by the M.A.N. (Machinenfabrik Augsburg Nurnburg) company in West Germany has won the name of "Whisper" engine. Known as the M system, the new combustion idea is the work of Dr. J. S. Meurer, who presented a paper describing the reasoning and experimentation which led to its development at the summer meeting of the Society of Automotive Engineers in Atlantic City.

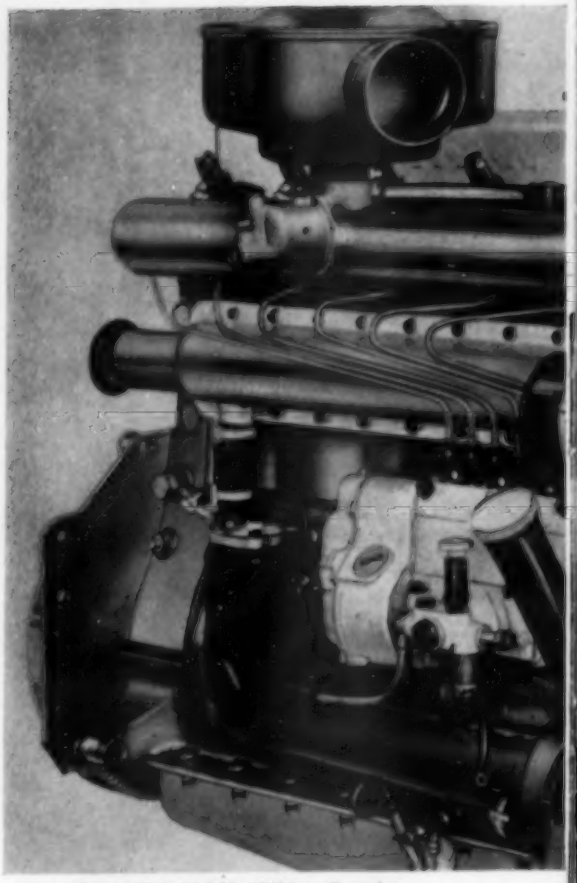


Fig. 1. This M.A.N. "Whisper" engine produces 130 hp at 2000 rpm. It has six cylinders with 4½ in. bore and 5½

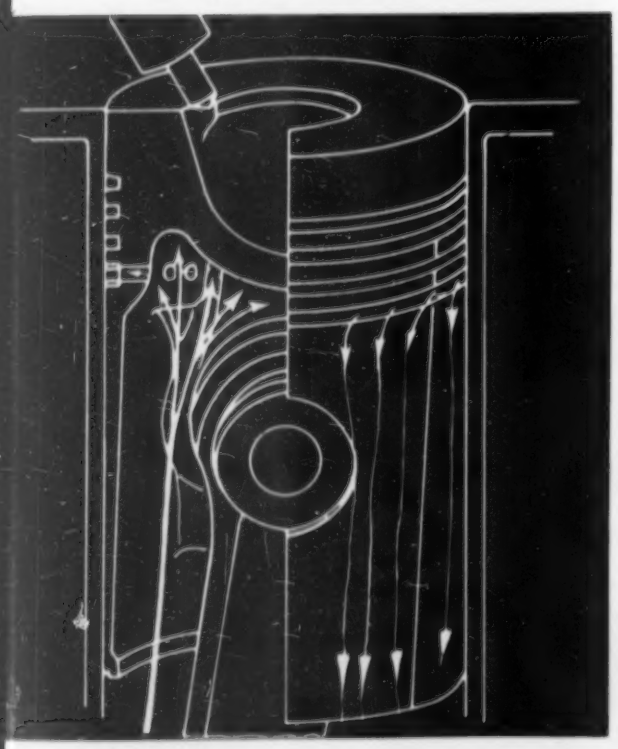
Three American firms manufacturing automotive type diesels have M.A.N. Whisper engines in their laboratories—namely Caterpillar Tractor Co., Peoria; Continental Aviation & Engineering Co., Muskegon; and General Motors, Detroit Diesel Division. Two of them have reported so far that their tests reveal that the engine is extraordinarily quiet and free from smoke. One report from these tests states that the engine makes no more noise when running at full power than when being motored over by the dynamometer.

Where the system breaks with tradition is in the method by which the fuel is introduced into the combustion chamber. Heretofore it has been universally accepted as axiomatic that—for the best combustion—fuel should be introduced as a finely-divided spray in such manner that it is quickly dispersed uniformly throughout the air volume, particular pains being taken to insure against any of the liquid fuel striking the walls of the combustion chamber.

This, says Dr. Meurer is a fallacy and accounts for the noisiness of the diesel as compared with the gasoline engine. Accordingly, in the Whisper engine, the fuel is injected in two solid streams directly onto the combustion chamber walls in such manner that it will spread over approximately half the area of the combustion chamber, a tiny portion being projected into the open chamber to serve as a combustion starter or kindling.

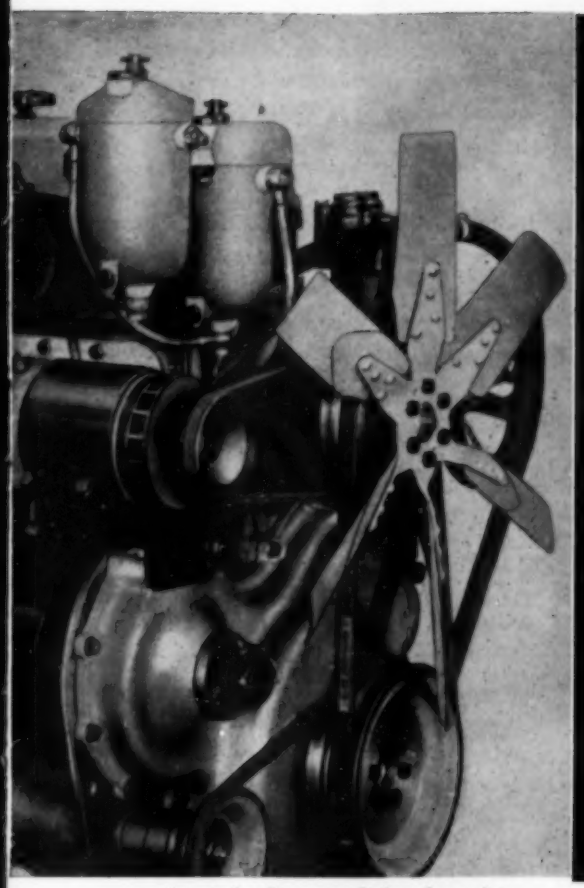
Dr. Meurer explains why this revolutionary injection system results in virtual elimination of so-called diesel knock, in terms of thermokinetics and chemistry. Boiled down, the Meurer theory is that when the fuel is mixed homogenously with the air, it is raised in temperature in the presence of oxygen. This produces chemical changes in the fuel which cause it to ignite relatively slowly, followed by combustion at too rapid a rate, in which it burns incompletely. In the Whisper or M system, he continues, the fuel is spread in a thin layer over a major part of the surface of the combustion chamber at controlled temperature. (See Fig. 2.) Introduced in this way, it vaporizes while exposed to the minimum of oxygen, evaporating before being mixed with the air and igniting by inflammation rather than auto-ignition. Thus is produced a true burn rather than a detonation. The fuel burns more completely, thus avoiding smoke.

Fig. 3. Cross-section drawing showing the flow of oil around the piston.



This is partly explained by the fact that when the fuel droplets in the spray are vaporized while suspended in the air, the excess of oxygen present induces undesirable chemical reactions on the unburned portion of the droplet which not only retard combustion but form pure carbon which, instead of burning, forms smoke and soot. Also, it has been found that pre-vaporized fuel has a higher ignition point than in the liquid state.

To promote this rapid surface evaporation, the temperature of the combustion chamber walls is controlled, and, to induce rapid and intimate mixing of the vapor with the air, the latter is made to swirl rapidly. By this means, Dr. Meurer declares fuels of low cetane value are made to perform



in. stroke. Its name derives from the quietness with which it operates, achieved by a new combustion theory.

Fig. 2. This diagram shows the direction of the fuel spray and the manner in which the fuel is spread over the walls of the combustion chamber. Temperature of the wall is controlled. A true burn of fuel, instead of a detonation, is accomplished by Dr. J. S. Meurer's revolutionary theory.

equally as well as those of high cetane number. In addition, it is claimed that the engine will accept and operate satisfactorily on a wide range of viscosities, from purified crude oil to gasoline. This is of tremendous importance, in view of the difficulty which the petroleum industry is encountering in producing a sufficient quantity of high-cetane fuel at an attractive price.

The M.A.N. engines incorporating the M combustion system are quite conventional except in the design of the piston, the piston-cooling arrangement, and the disposition of the injection nozzle and the orifices in its tip. Fig. 4 shows a cross-section of the upper portion of the cylinder and head, showing the inclined injection nozzle and the nearly spherical combustion chamber formed in the piston crown.

By means of the directional disposition of the intake porting, the indrawn air is induced to swirl rapidly and smoothly in the cylinder. As the piston approaches the top of its compression stroke, more and more of this swirling air is forced into the small-volume combustion cavity in the piston. At the top of the stroke, the large quench area—between the flat under surface of the head and the wide, flat rim of the piston crown—causes a pronounced squish effect, adding impetus to the swirling air mass at the moment of injection.

Bosch multiple-unit injection at the moderate hydraulic pressure of 2500 lbs. per sq. in. is used, the nozzle being of the open-jet type with two orifices. These are so positioned that the fuel issues in two solid streams directed tangentially against one side of the combustion chamber wall, so that it spreads in a film only about six-thousandths of an inch thick at full load, over approximately 55% of its area.

An important point in connection with the method of fuel injection is that the fuel is not atomized, but issues as a solid streams, to minimize contact with the air at the initial stage. The direction of these two streams is such that only about 5% of the fuel injected escapes into the open combustion chamber, in the form of a spray. This ignites in the conventional manner, providing a weak kindling combustion to hasten ignition of the fuel evaporating from the combustion chamber wall. Here the fuel picks up heat from the wall and vaporizes, with very little contact with oxygen until, having evaporated, it is picked up by the rapidly-swirling air and burned progressively as it meets the oxygen in the air.

In this combustion process, it is important that the rate at which evaporation of the fuel from the wall be controlled. For this purpose, it is essential that the film of fuel be deposited rapidly and evenly, which is effected by directing the stream from the nozzle in the same direction as the air swirl, so that the air, passing over the surface of the film, carries it along with it at a rate of speed diminishing as the film spreads.

Perhaps the outstanding difference claimed between the combustion process of the Whisper engine and other diesels is in the fact that spontaneous or self-ignition does not take place. Instead, the fuel vapors—as they arise from the film and are carried away by the swirling air—are ignited externally by the flame already present in the combustion chamber, triggered by the kindling charge. Thus combustion becomes a progressive burning, rather than a simultaneous detonation of all parts of the charge.

Obviously, the temperature of the combustion chamber wall is of great importance. Desirable wall temperature must be high enough to promote rapid vaporization but not so high that thermal decomposition or cracking will take place. Consequently, special means have been devised to maintain temperature within narrow limits. Due to the large volume of aluminum contained in the piston crown and the relative remoteness of much of the combustion chamber wall from the cylinder liner through which the heat must eventually escape, the walls tends to absorb and hold high temperature. To keep this temperature within bounds, auxiliary cooling is necessary. This is provided by a jet of lubricating oil which is projected upward from squirt ports in the crankcase portion of the block, directed to that portion of the under surface of the combustion cavity adjacent to the area over which the fuel is spread by the nozzle. In this area, ports are drilled through the piston wall, just below and into the groove of the oil control ring.

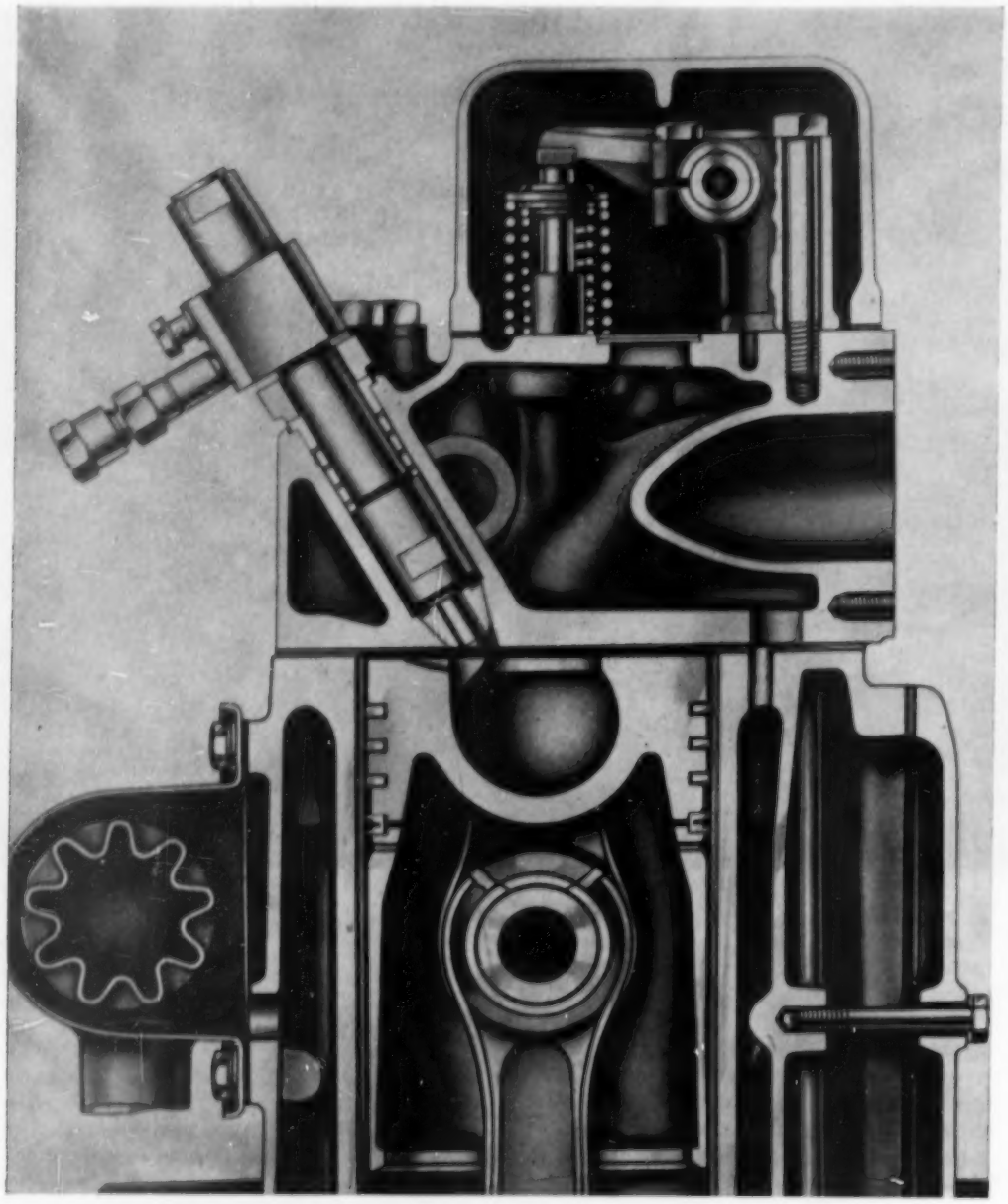


Fig. 4. This cross-section of the M.A.N. Whisper engine shows the spherical combustion chamber in the piston crown and the disposition of the injection nozzle.

The escaping oil is thus spread over the adjacent surfaces of the piston skirt and liner, to convey the heat quickly from the oil to the latter. Lubricating oil temperature is obviously an important factor. Special means of maintaining it are essential. For this purpose, a heat-exchanger, discernible at the left in Fig. 4 is employed.

Dr. Meurer points out that the impingement of liquid fuel upon the combustion chamber walls in the M-system is not the same thing at all as when this occurs in a conventional diesel. The difference is that in the latter, the fuel, being in a finely-divided state, has been exposed to both the heat of the air and its oxygen, so that chemical reaction has already begun before the fuel reaches the walls.

In the M system, the fuel reaches and films out over the wall surface in the liquid state and in very meager contact with the air.

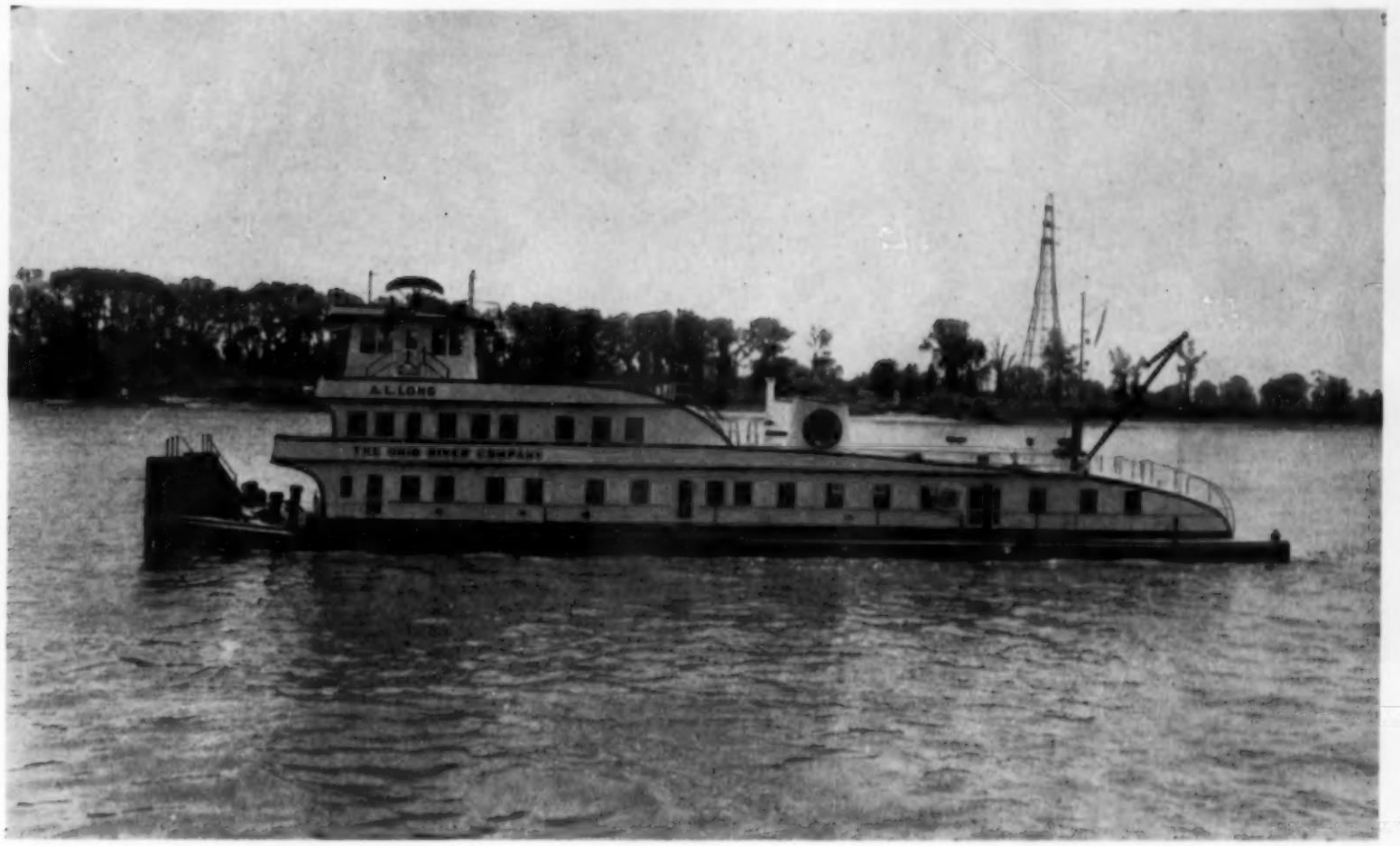
In operation, starting at the beginning of the intake stroke, air is drawn in through the tangentially-disposed intake ports so that it swirls in the cylinder at several times the speed of the engine itself. On the compression stroke, momentum maintains this velocity with small diminution until the piston approaches top dead center. At this point, the sudden displacement of the volume above the flat portion of the piston, forcing a squish of air inward to the combustion chamber, accelerates the swirl. At the proper moment ahead of top dead center, injection starts, the fuel being injected by the nozzle in two streams, tangentially to the wall of the combustion chamber and downstream of the direction of air swirl. These streams impinge upon the wall at different points and are rapidly spread over more than half of the combustion chamber wall area by the force of injection and the urging of swirling air. Thus the fuel is spread as a film, up to a maximum thickness, at full power, of six-thousandths inch. Meanwhile about 5% of the fuel injected in these two jets is atomized as a spray, penetrating the core of air in the combustion chamber, where it immediately ignites, as in conventional diesels.

Such is the temperature of the combustion chamber walls over which the film of fuel is spread that the fuel is quickly vaporized with limited oxydation and evaporates from the surface. It is immediately swept up by the rapidly-swirling air and ignited by the kindling flame already present. This combustion continues over an appreciable number of degrees of crankshaft travel, giving satisfactory mean effective pressure without excessive peak pressure or steep rates of pressure rise.

During this sequence of events, lubricating oil has been sprayed continuously into the piston, impinging on the outer surface of that portion of the combustion chamber wall which receives the fuel film, thus maintaining the temperature of its inside surface at about 650°F. (See Fig. 3.) Part of the oil thus sprayed into the piston escapes through vents into the oil control ring groove, whence it is distributed over the piston skirt for rapid transfer of heat to the cylinder liner.

Because the fuel is spread out over cold metal surfaces, in the liquid state, in starting, with only 5% being sprayed into the open chamber, the Whisper engine cannot be started cold without external aid. As produced by the M.A.N. company, a fuel-burning pre-heater of novel type has been developed to overcome this difficulty. It consists of a species of burner with an air blast supplied from the vehicle system which throws a flame into the air cleaner, which is provided with a heat-storing metal insert. This heater is started about 30 seconds before the starter is activated and continued in operation until the engine has come up to normal temperature. It serves to warm the intake air to approximately 110°F. prior to starting.

Assistance to starting is also afforded by a "torque control" provision in the governor which retracts the rack stop sufficiently that at speeds below 800 rpm maximum fuel delivery is 180% of normal. This proportionately increases the portion of the fuel which is atomized directly into the core of the combustion chamber and hence is the means of producing enough heat and pressure to start the engine firing. It is claimed that this over-injection at low rpm is not harmful, since there is no detonation. Other methods also have been explored, such as the use of auxiliary nozzles to spray the fuel directly into the center of the combustion chamber, rotating nozzle, accomplishing the same result and auxiliary intake valve masking to reverse the direction of air swirl.




# TOWBOAT "A. L. LONG"

*By* A. D. BURROUGHS

THE new modern diesel towboat, the *A. L. Long,* built and designed by St. Louis Shipbuilding and Steel Corp., is the most recent addition of the Ohio River Co. fleet. As the third in the series of sister boats, the *A. L. Long* is ample proof of the saying that the third time is more than a charm in horsepower, rugged construction, high efficiency, employee comfort and plain beauty.

The craft's sister ships, the *Mike Creditor,* completed in February of this year, and the *A. H. Crane,* delivered in 1954, have set high standards for performance and economical operation. Equipped with the latest in modern marine equipment, this new addition is expected to carry on this tradition—handling coal barges for the Ohio Valley Electric Corp.

Named for the well-known vice president and general superintendent of the Ohio River Co., this new boat is 140 ft. in length, by 35 ft. in breadth, with a normal draft of 6 ft. 6 in. Like her sister boats, well-developed stern lines will permit water to enter the propellers as easily from the sides as from the bottom. Specially designed Kort Nozzles give the 2100 hp boat an increase of more than 25% in her pushing power.

The first impression of the pilothouse is one of extreme spaciousness. A front window gives clear vision in all directions. A Morse engine control stand and two pairs of steering levers are located in the pilothouse console. Complete mechanical control of the main engines and reduction gears is possible from the pilothouse. Also located in the pilothouse are the radio-telephone, the radar set, and the manual controls for the searchlights.

As with the *Mike Creditor,* this third sister's attractive, all-welded steel constructed deckhouse has streamline design with the modern approach for combining practical comfort for employees. The large overhang of the decks forward gives the boat a distinctive appearance while providing added protection from the weather for men working on the forward deck.

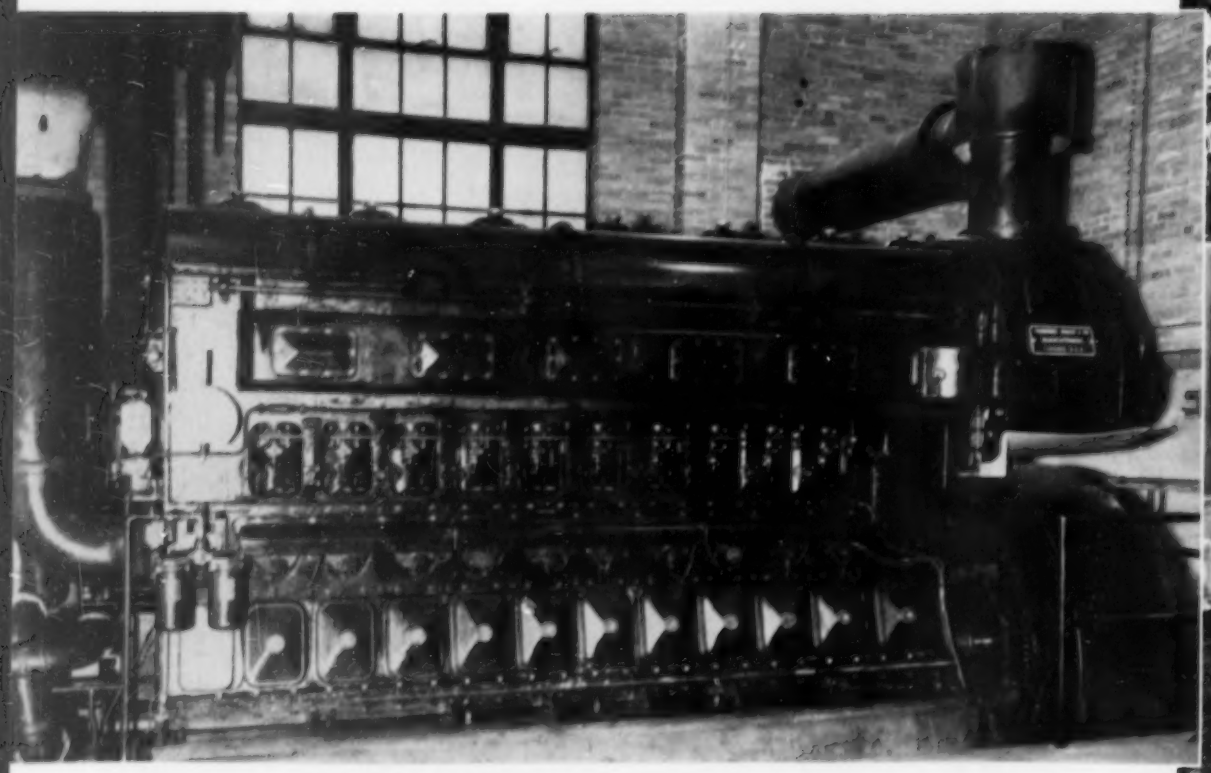
The point of greatest interest, however, is the engine room, with steel partitions at the forward and aft ends. For both visitors and experienced river men, the center attraction of this room is the two Baldwin-Lima-Hamilton Model 606-SC, 6-cylinder, supercharged 12¾-in. by 15½-in., four-cycle marine diesel engines. Each is rated at 1080 hp at 600 rpm. Through reverse and reduction gears with 2.516:1 ratio and Airflex clutches, the 920-in. diameter, four-blade, cast-steel propellers turn at 238 rpm. Cooling of the main engines is done by circulating the jacket water through St. Louis Ship closed skin cooling ducts.

Steering equipment consists of two powerful steering systems of the St. Louis Ship mechanical-hydraulic type. One system controls the two steering rudders and the other controls the four flanking rudders. Rudders can be turned from hard-over to hard-over in 12 seconds while towing.

Now in active duty on the Ohio, the *A. L. Long* was at Cincinnati soon after completion where she was shown to company officials and other interested persons. This craft makes an even 10 diesel towboats in regular operation for the Ohio River Co.

## List of Equipment

Main engines—(2) Baldwin-Lima-Hamilton, model 606-SC., 6 cyl., supercharged, 4 cycle, each rated at 1080 hp at 600 rpm.
Reverse-reduction gears—(2) Falk.
Exhaust silencers (4)—Burgess-Manning, one on each engine and auxiliary engine.
Lube oil coolers—Graham.
Lube oil purifiers (2)—Hilco.
Lube oil filter—Hilco.
Circulating water pumps (3)—Aurora.
Auxiliary generator sets (2)—Caterpillar, each 75 kw, 3-phase, 60-cycle, 220 volt ac.
Switchboard—Lake Shore Electric.
Air compressors (2)—Quincy.



This is the first of the opposed-piston F-M engines installed in the Paris municipal power plant. It is rated 1600 hp and drives a 1136-kw alternator at 720 rpm. Shown are the Nugent duplex fuel oil filters and the Woodward governor.

# PARIS, KENTUCKY

*By* DOUGLAS SHEARING

ONCE natural gas became available in its section of the country in late 1952, the municipal power plant at Paris, Ky., wasted no time in doing what a growing number of municipalities have been doing since the end of World War II. Despite a 20-year record of profitable operation under straight diesel operation, the forward-looking plant undertook a program which has seen more than 93% of its total production converted to dual-fuel. As a result, operating costs have been cut by more than 31%, from 12.4 mills per kw/hr. in 1952 to 8.5 mills in 1954. Fuel costs have been cut more sharply, from 9.7 mills per kw/hr. in 1952 to 5.7 mills last year, an average overall reduction of more than 41%.

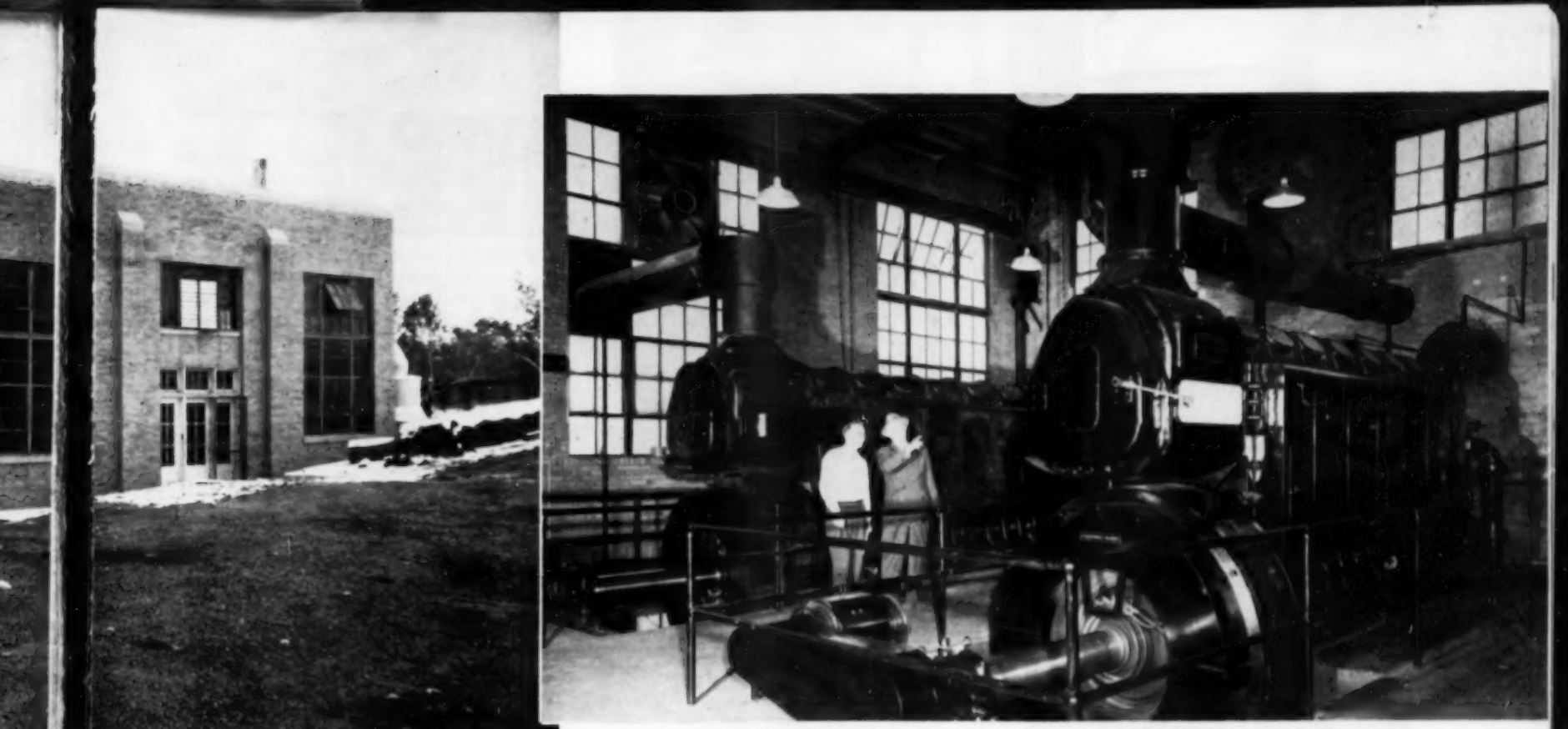
Chiefly responsible for these savings are three Fairbanks-Morse dual-fuel engines, two of which were installed in 1953 and 1954 and one of which was originally installed as a diesel engine in 1947 and converted to dual fuel in 1953. The two new engines are 12-cylinder, 1920- hp, Model 38D-8⅛, opposed-piston units, driving 1360-kw alternators. The converted engine is a 7-cylinder, Model 33F16 unit, driving a 980-kw alternator. In addition, the plant has two Fairbanks-Morse 100% oil burning diesel engines. One is a 10-cylinder, 1600-hp, Model 38D-8⅛, opposed-piston unit installed in 1949, and the other a 6-cylinder, 1050-hp, Model 33D16 unit installed a few months after the plant first went into operation in 1934. After more than 21 years of service, this veteran engine still operates with normal fuel economy and regularly is used during off peak periods.

The savings introduced were achieved despite a relatively high price paid for natural gas, 38¢ per MCF, and despite a clause in the power plant's contract with the local gas utility which specifies that no gas will be delivered when the thermometer drops below 20°F. This is necessary because in freezing weather the gas utility must utilize its full supply to meet the increased residential demands. Due to this clause, in 1954 the power plant was forced to generate 7% of its total production on fuel oil, a factor which modified effects of dual-fuel conversion. At the end of 1954, the average price paid for pilot oil was 11.5c per gallon. The 31% reduction in operating costs reported for 1954, when the plant spent a total of $85,504 for superintendence, labor, gas, fuel oil, lubricating oil, maintenance, supplies, and miscellaneous expenses, reflects an estimated saving of $38,625. It is interesting to note that, as a result of this increased economy, it actually cost the plant less last year to generate 10,010,470 kw/hrs. than it did in 1952 to generate 9,017,575 kw/hrs. The total operating costs in 1952 were $111,870. (See Table I).

The Paris, Ky., plant always has been profitably operated, returning to the city net profits of more than half a million dollars since 1934. In 21 years of community service, the plant has generated 105,964,943 kw/hrs at a total operating cost of $1,078,602, which means 10.1 mills per kw/hr. The additional profits now anticipated with the new dual-fuel engines will be used to keep power rates at a minimum, to help reduce local taxes, to limit municipal borrowing, to finance civic improvements, and to help attract new industries.

The use of power plant profits to help improve community life in Paris is typical of a broad role being played by municipal power plants in hundreds of American cities and towns. Frequently the municipal light and power utility is a city's largest single business enterprise. Funds provided by the Paris plant, for example, have been used to match funds from the Chamber of Commerce in building two factories within the city limits. These factories, designed to attract industry to Paris, have employed as many as 400 persons each. Power plant profits also have been used to finance a new school building, a hospital and a library, to build three concrete bridges, to buy a fire truck, to build a playground, to buy a street sweeper. An historic building was purchased and turned over to the D.A.R. for maintenance. Funds were advanced to bring an American Legion convention to town. In addition, the plant supplies free lighting to local ball parks, charitable bazaars, Christmas displays and carnivals. Remaining profits have gone to improve city services and keep taxes low.

All financial contributions, of course, are in addition to the plant's basic job of providing low-cost power. Dependable power is vital to a modern city like Paris. It is needed at the Liggett and Meyers tobacco drying plant where tobacco for cigarettes is processed. It is essential for operation of the grass seed stripping plant which prepares Kentucky blue



**Five dual-fuel Fairbanks-Morse engines in this plant have helped return more than half a million dollars to the welfare of this Kentucky city. Exhaust silencers are Burgess-Manning.**

**Zane F. Barnes, left, Supt., Distribution & Light, and Boone Baldwin, City Managing Agent, inspect the No. 2 O-P engine. These engines are rated at 1920 bp. Alnor exhaust pyrometers are used.**

grass for world markets. In brief, dependable power means uninterrupted production for 11 industrial accounts, continued business activity for 365 commercial accounts and light, heat, power and refrigeration for 1558 homes.

In 1954, the three Fairbanks-Morse dual-fuel engines operated for a total of 11,780 hours, producing 9,382,400 kw/hrs and consuming 110,424 mcf of gas. This represents an average gas consumption of 11.7 cu. ft. per kw/hr. At the same time a total of 77,590 gals. of pilot oil was consumed, for an average of .0082 gals per kw/hr. With gas at a price of 38¢ per mcf and pilot oil at a delivered price of 11.5¢ per gal., this represents an average fuel cost of 5.4 mills per kw/hr. Generation of an additional 628,070 kw/hrs on fuel oil alone brought the plant average to 5.7 mills.

Expansion has been a recurring theme at the Paris plant. In 21 years, its annual production has increased from 1,880,000 kw/hrs to more than 10,000,000 kw/hrs and its peak load has climbed from 503 kw to 2810 kw. At the present time, Boone Baldwin, City Managing Agent, reports that the demand is increasing by an average of 10% from year to year, due to increased use of television, air conditioning, appliances and other electric equipment in the home.

Zane Barnes, the plant superintendent, has arranged his operating schedule to take full advantage of dual-fuel economy. He generally runs the converted 1400-hp unit during the period from late evening to 7 a.m., when the load varies from 400 kw to 800 kw. He then uses either or both his 1920-hp, opposed-piston, dual-fuel units to carry the heavy loads during the morning and afternoon hours. The two oil units are used both on peak and off peak as load and gas conditions dictate. During freezing weather, when the supply of natural gas is shut off, Mr. Barnes generally follows the same schedule, running the three dual-fuel engines on oil. Each engine is equipped with automatic safety devices which switch it over to oil operation should gas pressure fail during operation. Should pilot oil pressure fail, the units shut down automatically, preventing gas from collecting in the system.

Natural gas arrives at the plant at a pressure of 40 lbs. and, after passing through individual meters and regulators, is cut down to 35 lbs. before reaching the engines. It is guaranteed at 1000 btu. per cu. ft. Diesel oil is delivered at the plant by truck and is unloaded into two 20,000-gal. above-ground storage tanks. It flows by gravity through strainers and individual meters to separate 500-gal. day tanks for each engine. Flowing by gravity again, it is picked up at each engine by an engine-driven supply pump, passing through duplex filters before reaching the injection pumps. Twin injection pumps and nozzles supply fuel to each cylinder on the three O-Ps.

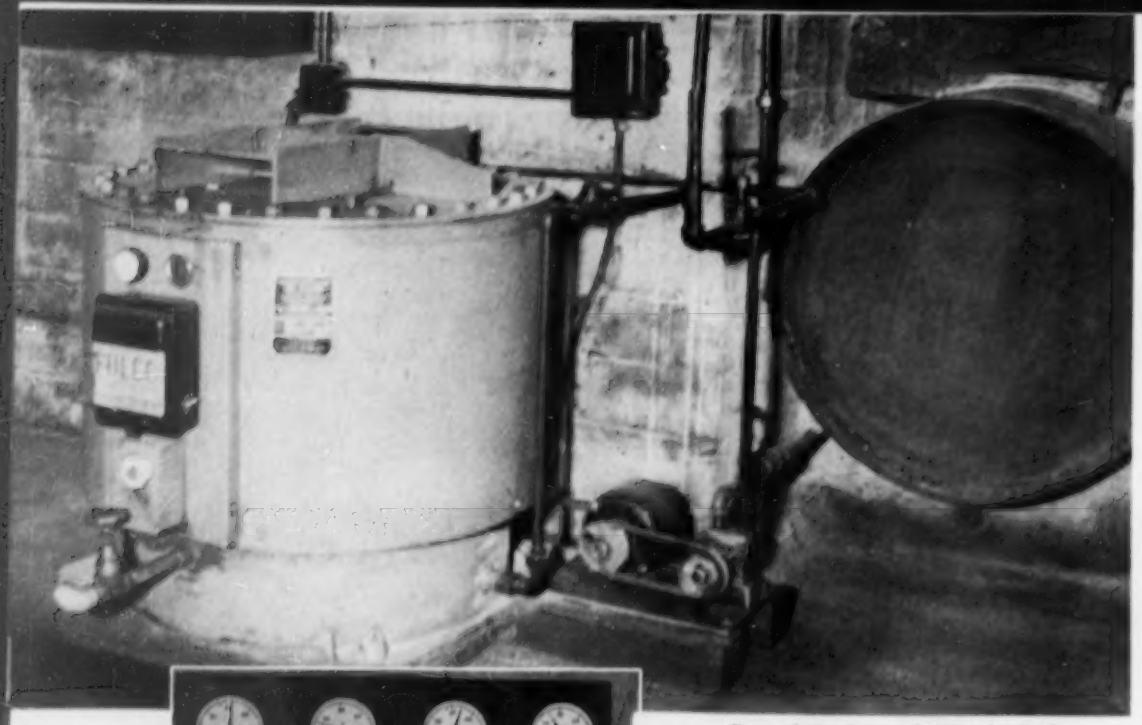
A detergent type lubricating oil is used throughout the plant and is stored in a 2000-gal. tank. It is pumped through each engine's pressure system by a built-in, engine-driven lube pump and is cooled in individual heat exchangers. Double protection is afforded by a full-flow strainer and by a by-pass cartridge-type filter for each engine. Three of the filters are equipped with self-contained heaters.

Individual, motor-driven auxiliary lube pumps bring pressure up before starting the engine. A 3000 or 5000-hour check is made on each engine's lube, depending upon the unit. The oil company, which conducts these tests, recently found the lube in the No. 1 O-P dual-fuel engine to be in excellent condition after 9000 hours of service.

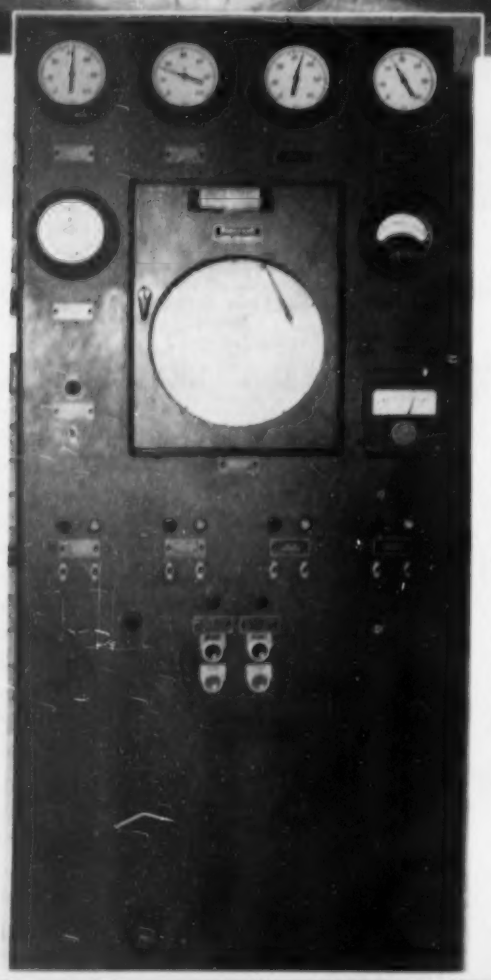
At the time the plant expanded its facilities, it also installed a rather unusual raw water system. Cool water from a nearby creek, with a depth of 10 feet, is pumped through five jacket water heat exchangers and five lube oil coolers by a single motor-driven pump, mounted on a concrete foundation at the creek edge. This 8-in. pump is a vertical turbine unit, driven by a 20-hp, 1750-rpm motor and emasures 19 ft. 9 in. to the bottom of suction. It is protected by a bar rack with one-inch spacings. What is unusual about this pump is its underwater discharge line, in which a vacuum is created once the pump is in operation and suction commences. This vacuum causes an appreciable drop in horse-

**Table I**

| Kw/Hrs Generated | 1952 | 1953 | 1954 |
|---|---|---|---|
| Plant | 9,017,575 | 9,830,140 | 10,010,470 |
| Kw/Hrs Generated Diesel | 9,017,575 | 4,746,905 | 628,070 |
| Kw/Hrs Generated Dual-Fuel | ..... | 5,083,235 | 9,382,400 |
| Fuel oil used (gals.) | 761,080 | 363,400 | 54,780 |
| Pilot oil used (gals.) | ..... | 48,480 | 77,590 |
| Gas used (mcf) | ..... | 60,974.1 | 110,424.6 |
| Pilot oil consumed Per Kw/Hr (gals.) | ..... | .0095 | .0082 |
| Gas Consumed Per Kw/Hr (cu.ft.) | ..... | 11.9 | 11.7 |
| Total Fuel Cost Per Kw/Hr (mills) | 9.7 | 7.1 | 5.7 |
| Total Prod. Cost | $11,870 | $93,216 | $85,504 |
| Aver. Prod. Cost Per Kw/Hr (mills) | 12.4 | 9.4 | 8.5 |

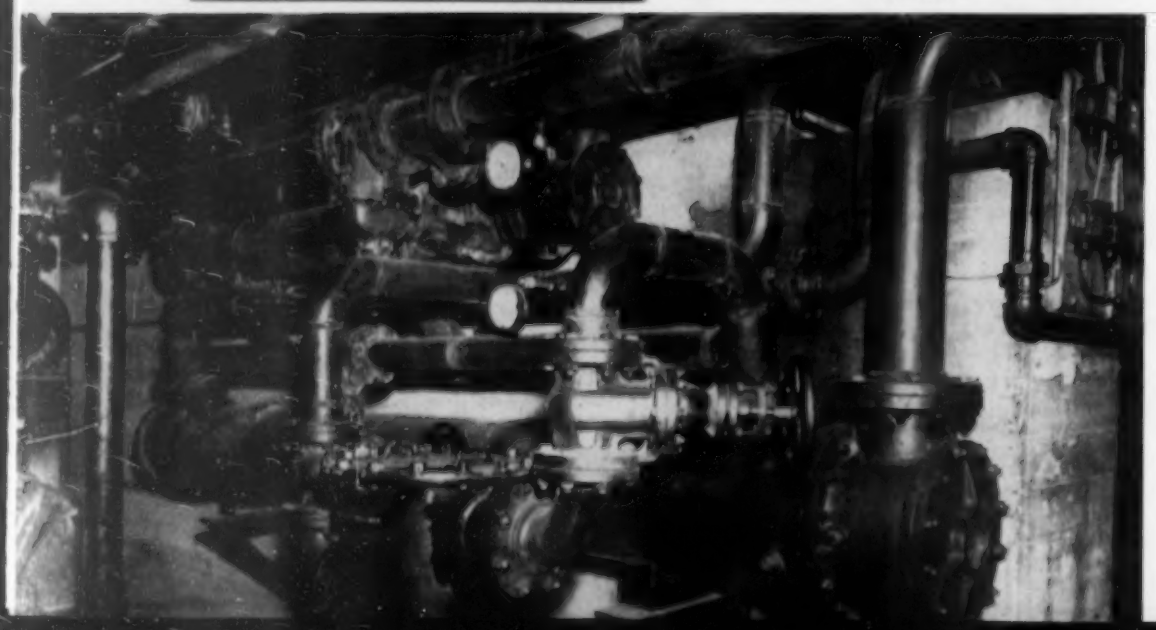


Four of the five engines in the Paris plant are equipped with Hilco by-pass lube oil filters. This unit, equipped with a self-contained heater and circulating pump, serves the No. 1 O-P engine.



This gauge board is equipped with Marshalltown gauges, Brown Instrument 24-hr. recording meter, Midget Levelometer and Alnor exhaust pyrometer. It serves the No. 2 engine.

Installed in the full basement and serving the No. 2 engine is this Air-Maze full-flow lube oil strainer, Ross jacket water heat exchanger, and Ross lube oil cooler.



power demand at the motor and saves aproximately 100 kwh per month. A recent test, conducted when the cooling systems on all five engines were fully open, showed that the motor's output dropped from 20 hp to 8½ hp shortly after starting. Soft city water is circulated through the cylinder jackets of each engine by an individual motor-driven circulating pump. It passes first through a water softener, which reduces it to zero hardness, and is then rendered anti-corrosive by means of chromate pellets.

Scavenging air for the 1400-hp, Model 33 dual-fuel engine is drawn through a duplex oil-bath filter and silencer, while impingement type filters serve the remaining four engines. Starting air at 250 lbs. is supplied by two 3¾ in. x 3⅜ in. compressors, one driven by a 3-hp electric motor and the other by a 3-hp gasoline engine. Both are equipped with V-belt drives. Exhaust gases are expelled through vertical silencers mounted against outside walls.

Conveniently located gauge boards, designed for quick reading, are installed at each engine. Those boards serving the two O-P dual-fuel engines are equipped with pressure gauges on gas, lube oil, fuel oil, jacket water and scavenging air, as well as 24-hour recording meters on jacket water and lube oil temperatures. They also feature visual and audible alarms on low lube oil and jacket water pressure and on high lube oil and jacket water temperatures. Each board has a multi-point exhaust pyrometer and is equipped with push-button controls for the before-and-after lube oil pumps and raw water pumps. The boards on the remaining three engines are similarly equipped, with the exception of those serving the two oil units. These have no gas pressure meters, of course. Power from the five F-M alternators at the plant is controlled at an 11-panel switchboard, equipped with voltmeters, recording voltmeter, ammeters, kw meters and synchroscope, totalizing kw/hr meters, and oil circuit breakers. There is also a rocking contact voltage regulator for each engine. In all there are five engine panels, four distribution panels, plus a separate distribution panel for the plant and for the adjoining water department building.

## List of Equipment

Main engines and generators—Fairbanks-Morse. (2) Model 38D-8⅛, 12-cylinder, 8⅛ x 10, opposed-piston dual-fuel engines, rated at 1920 hp at 720 rpm and driving two direct-connected F-M 1700 kva, 1360-kw, 3-phase, 60-cycle, 2400/4160-v alternators with v-belted 15-kw, 125-v exciters. (1) Model 33F16, 7-cylinder, 16 x 20, dual-fuel engine, rated at 1400 hp at 300 rpm and driving a direct-connected F-M 980-kw, 1225-kva 3-phase, 60-cycle, 4160-v alternator with v-belted 20-kw, 160-amp exciter. (1) Model 38D-8⅛, 10-cylinder, 8⅛ x 10, opposed-piston diesel engine, rated at 1600 hp at 720 rpm and driving a direct-connected F-M 1420-kva, 1136-kw, 3-phase, 60-cycle, 4160-v alternator with direct-connected 10-kw, 80-amp exciter. (1) Model 33D16, 6-cylinder, 16 x 20 diesel engine rated at 1050 hp at 300 rpm, and driving a direct-connected 731-kw F-M alternator with 15-kw motor-driven exciter.

Governor—Woodward.

Gas meters and regulators—Fisher.

Fuel oil duplex filters—Nugent.

Fuel oil strainers and meters—Buffalo Meter.

Lubricating oil—Texas Ursa HD.

Lube oil by-pass filters—Hilliard (4); Houdaille-Hershey (1).

Lube oil full-flow strainers—Air-Maze (4); Schutte & Koerting (1).

Lube oil coolers—Kewanee-Ross (4); Schutte & Koerting (1).

B & A lube oil pumps—Roper.

Jacket water heat exchangers—Kewanee-Ross (4); Schutte & Koerting (1).

Air-intake filters—American.

Exhaust silencers—Burgess-Manning.

Gauges—Marshalltown.

Exhaust pyrometers—Alnor.

24-hour recording meters—Brown Instrument.

Switchboard—Fairbanks-Morse.

Voltmeters, ammeters, kw meters and synchroscope—Weston.

Recording voltmeters—Bristol.

## A CIVIL DEFENSE INSTALLATION

# BOEING'S EMERGENCY DIESEL SET

*By* CHAS. F. A. MANN

THE giant Boeing Airplane Co., Seattle, has grown so fast and continuously that announcement of another expansion merely causes the natives to shrug and say "ho-hum." In the construction of Building 201, a giant warehouse, however, something new, different and interesting has been added. This building is needed for the company's jet tanker and fighter programs, and also will serve the projected production of jet transports.

Boeing officials decided the new warehouse should be independent of local power supply in case of emergencies. Not so unusual. The *different* feature is that the emergency generator plant was made a part of the basic structural plan and was installed as the building went up, right along with the other elaborate mechanical equipment. Another interesting angle is that, in addition to all the "normal" emergencies that can happen to a building, management at Boeing took into consideration that a plane landing on their airfield might sever power lines providing electricity to the building.

Compactly located in a relatively obscure space in front of the heating boiler firing faces, the emergency unit is a Katolite-General Motors diesel-electric plant, designed to cut automatically into the power supply in from eight to 10 seconds. In case of normal power failure, the diesel set can supply power for many purposes including lighting, motors on the boiler fuel burners, and the signal system in the building.

The 4-cylinder Model 4030C GM Series 71 diesel delivers 95 shp at 1800 rpm. It turns a 60-kw, 75-kva, 3-phase, 60-cycle Kato Model 60 MRS6 generator with a Model 26 Kato exciter mounted on the generator shaft extension. Together with all control equipment and accessories, the unit is mounted on a single I-beam welded base. This is bolted to an elevated concrete block, separated from the concrete floor by a layer of felt matting. No vibration dampeners are used.

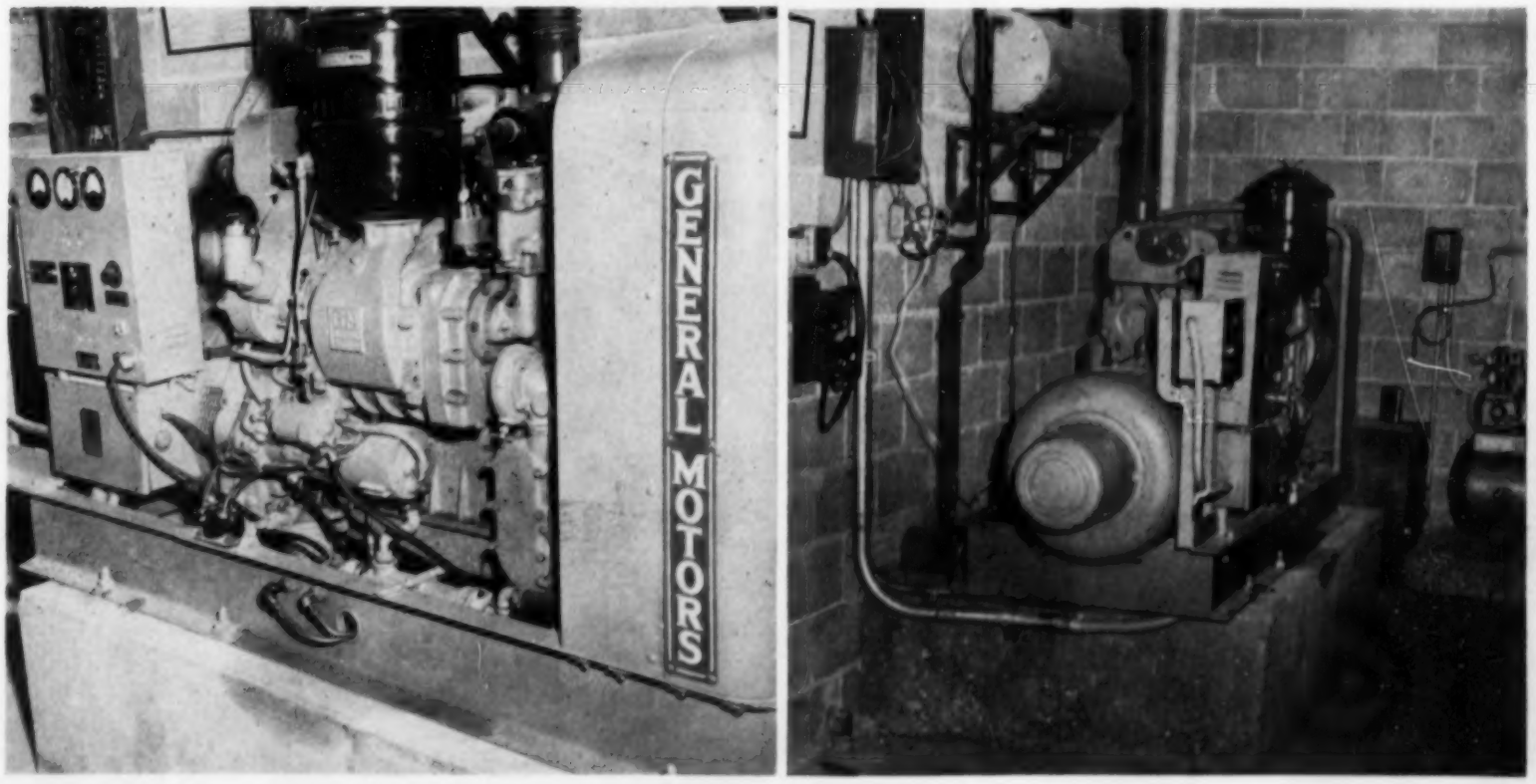
A Harrison Radiator assembly is carried at one end of the base. The fuel, lube oil, and air filters are all made by the A.C. Division of GMC. There is a Woodward governor on the engine. There is a 12-volt Delco electric starting system, and a 200 amp Exide-type battery. The Kittell residential-type muffler is fitted to the engine with a Rexwell flexible exhaust coupling.

The heart of the automatic control system is a Custom Built Controls unit, specifically tailored to the engine. It has a high water temperature and a low oil safety shutdown interlock. This control system handles the complete cycle, starting from a shutdown situation, attaining full load and speed, and then shutting down again. To keep the engine, fuel, and lube oil constantly at 160 degree operating temperatures, a Kim Hotstart electric engine preheat unit, Model A-110, is cut into the jacket water circuit.

A 294-gal. fuel storage tank is underground. A 25-gal., gravity-feed day tank is kept full by a Bendix pump that starts automatically when the engine is running. Other accessories include a La Marche fully-automatic battery trickle charger and an Automatic Switch line transfer switch.

Erection of Building 201 was done by these contractors: Levitt & Chandler, general; University Plumbing & Heating, mechanical; Service Electric Co., electrical, including the standby generator set. The Star Machinery Co., Seattle, Katolite's dealer in the Northwest, did the pre-installation assembly and fabrication work on the diesel-electric set.

**Two views of the GM emergency generator set installed in the Boeing plant. The Kato 60 kw generator, the Custom-Built controls and the Rexwell flexible metal exhaust hose are visible.**



# PUBLIC APPLAUDS ATKINSON'S HANDLING OF HIGHWAY JOB

by MARK OGDEN

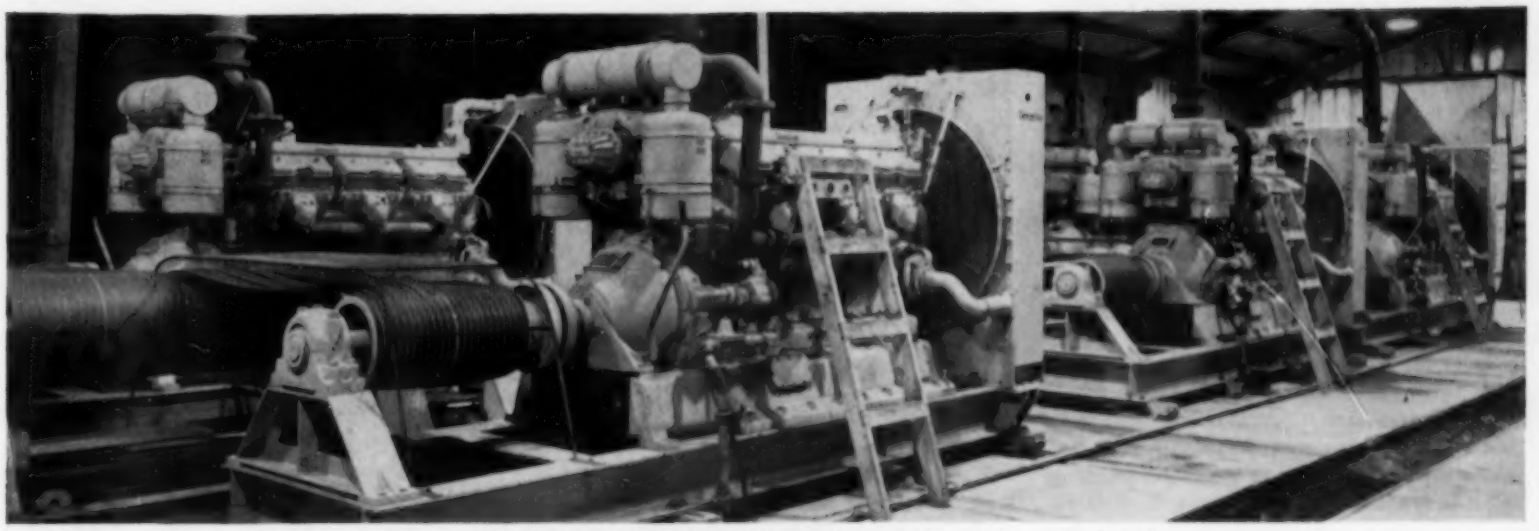
ENGINEERING contractors throughout the country well might send orchids to Guy F. Atkinson Co., South San Francisco, Calif., for the good will built for the entire industry while performing a big job under the public gaze. Not that the Atkinson officials launched a specific public relations campaign to win friends and influence people. Rather, friends were won, and the traveling public was impressed, by watching Atkinson men and machines perform their daily chores.

This demonstration of good community relations was in progress for many months during 1954-55 on the complicated Waldo Grade job just north of San Francisco. A major traffic bottleneck was alleviated by widening U.S. Highway 101 between the famous Golden Gate Bridge and the Richardson's Bay Bridge. This is a relatively short stretch of highway, but the contract won by Atkinson involved several extremely critical problems. Not the least of these was the necessity of working without interrupting the heavy flow of traffic. US 101 is the only direct lifeline into San Francisco from the vital agricultural and lumber producing areas to the north, including the redwood forests.

The Waldo Grade project was located in Marin County—heavily populated with commuters, cows, and canines. While the latter two classifications showed no apparent interest in the blasting, tunneling and earth-moving, the commuters followed progress on the job with open-eyed and vocal amazement. For thousands of men and women, traveling to work in the city in buses and private cars, the big job offered the first opportunity to witness big dieselized machinery at work. The daily commuters also were able to follow the steps taken by a big contractor in laying out and executing a big construction project.

**Air view of Waldo Grade. U. S. 101 climbs hill after crossing Golden Gate Bridge, enters tunnel, and winds down hill to a wooden Richardson's Bay bridge, now being replaced. When only one 4-lane tunnel penetrated the hill, this stretch of road was a terrific bottleneck. Tunnel and approaches on right are new. (Photo courtesy California Division of Highways.)**

**Guy F. Atkinson Company at all times has hundreds of Euclid rear- and bottom-dump trucks working in scattered spots around the globe. Most of the Eucs are powered by Cummins and General Motors diesels. This one was working at Candlestick Cove.**



**A major project Guy F. Atkinson Company currently has under way is construction of Cherry Valley Dam, high in the Sierra Nevada, not far from Yosemite. Electricity for the construction camp, and to operate a fleet of shovels and compressors, is provided by these Caterpillar diesels. There are five D398 and one D17000 engines in the camp power station.**

Interest was keen, probably more so among women than men, and compliments were frequently heard. Commuters not only openly admired the skill of operators of bulldozers, scrapers, and carry-alls working on steep slopes, but they also expressed awareness of the fact that careful, overall planning lay behind the operation.

The Atkinson management assigned sufficient heavy-duty equipment to the job to alter the landscape in big chunks. A commuter, coming home after eight hours in the city, could plainly see the progress that had been made. Veteran commuters were quick to recall frequent less pleasant experiences. They spoke in disparaging terms of "contractors with political pull" who tied up traffic for miles and for hours while making relatively simple street and road repairs with inadequate, broken-down equipment.

Few contracting firms in the country are as well fitted by experience as Guy F. Atkinson Company to stage a public exhibition of fast-moving, efficiently-directed construction work. Contracting has been in the Atkinson blood for generations, starting back in England. The founder of the present firm, which bears his name, started by working for and with his contractor father. Then, in 1907, Guy F. Atkinson moved to California and got in on the ground floor when the state began building roads in what was then considered a big way. With some of his present associates, he went on to building dams. The father took his two sons, George and Donald, to form the Guy F. Atkinson Company in 1929. Today, the father is chairman of the board, and George is president. The other son entered another field.

Today, Guy F. Atkinson Company is a contracting firm of international repute. Projects completed by the firm have introduced American-made machinery and diesel engines, to natives of remote areas in all parts of the world. The number and makes of diesel engines operated at any one time by Atkinson in its jobs would be difficult to compute but varies between 500 and 600 engines.

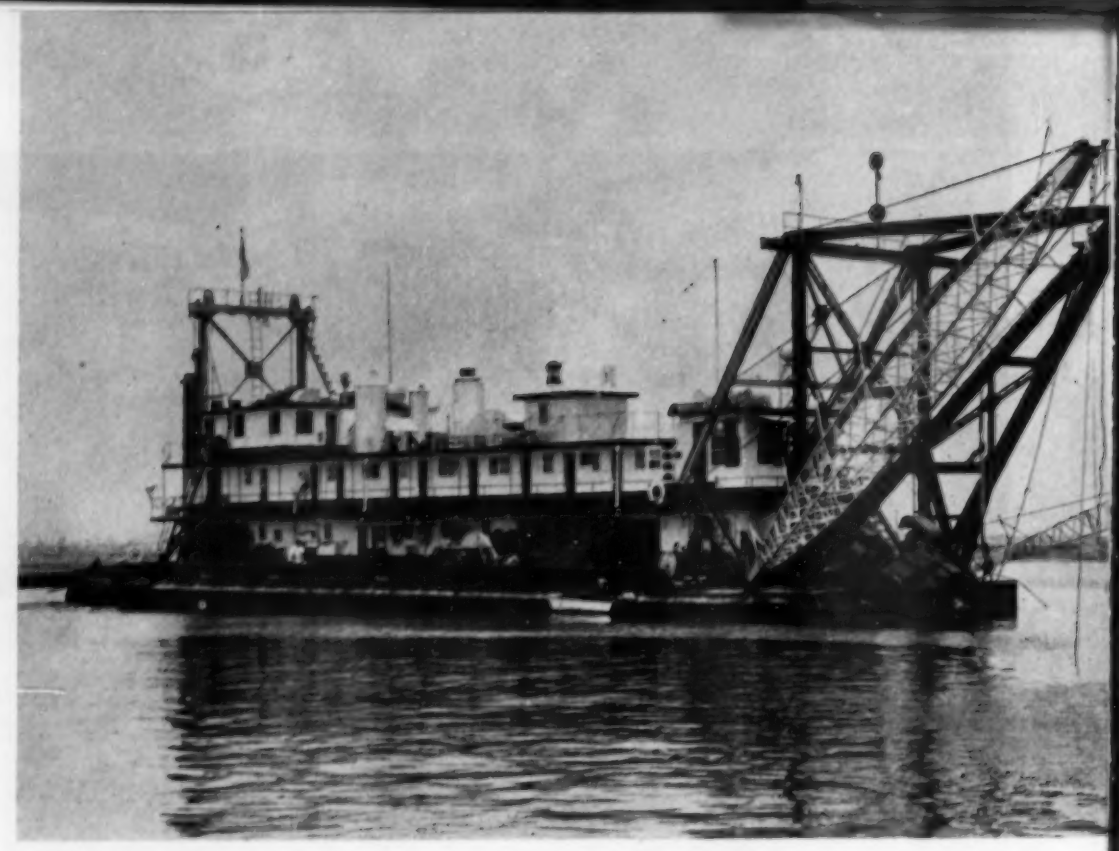
The company has had a hand in building many great dams, bridges, breakwaters, power houses, and highways. A few easily recognized projects selected from the many include Bonneville, Grand Coulee, McNary and Folsom dams; Hanford atomic project; and the Ketchikan, Alaska, pulp mill. Foreign construction of magnitude includes projects accomplished by Atkinson in Okinawa, Japan, Greece, and the Philippines.

An indication of the extent of the Atkinson operations can be drawn from knowledge of the big projects it has going at the present time within arm-length of its headquarters. Besides the Waldo Grade project (completed last March) and completion work on the powerhouse at Folsom Dam, the company has been moving great quantities of rock to fill in for highway purposes a portion of San Francisco Bay (Candlestick Cove project) and is working on Cherry Valley Dam in the High Sierras near Yosemite in what will be an additional reservoir for the San Francisco city water supply system.

**One reason why San Francisco commuters were favorably impressed with Atkinson's handling of the Waldo Grade highway widening job was that an adequate amount of properly performing equipment was assigned to the project. The number of No. 20 Cat scrapers in this picture indicates the rapidity with which earth was moved.**

**Atkinson's Candlestick Cove job of filling in a portion of San Francisco Bay provided a testing ground for this Cummins-powered Kenworth dump truck with a one-man, off-center cab. The shovel is powered by electricity. Filling of the marsh land will provide right-of-way for a fast freeway south from San Francisco.**

**Here is another view of the complicated Waldo Grade project, showing a Cat D8 diesel tractor with bulldozer. Steep cuts and deep fills had to be made with traffic whizzing by in order to widen U.S. 101. San Francisco and towers of the Golden Gate Bridge can be seen in background.**



# DREDGE "PORT ARTHUR"

SINCE being converted at her owner's yard in Morgan City, La., the 24-in. dredge *Port Arthur* is pumping upwards of 25% more yardage, on a daily average, than ever before. This increased production has been achieved without increasing the size of the vessel's 55-man crew and with an actual decrease in fuel consumption. Principally responsible for the sharp improvement in the *Port Arthur's* operating performance is a new 2800-hp Nordberg Supairthermal V-type diesel, installed at the time of her conversion and direct-connected to a 24-in. centrifugal pump. The new 16-cylinder engine provides an increase of 1050 hp over the old pumping arrangement and is expected to handle up to 50,000 cu. yds. per day under favorable conditions. Officials of the McWilliams Dredging Co., New Orleans, owners and operators of the vessel, believe the new engine to be the largest pumping unit ever installed on a 24-in. dredge.

The *Port Arthur* was originally built in 1939. Her hull measures 151 ft. by 38 ft. 4 in. by 10 ft. and she draws 6½ ft. of water. Until her conversion, the *Port Arthur* was equipped with a 20-in. centrifugal pump driven by a 1325-hp, 360-rpm diesel and a 450-hp synchronous motor. The motor was mounted directly on the drive shaft between engine and pump and was powered by the dredge's 1015-kw ship's service diesel-generator set. This arrangement provided a maximum of 1750 hp at the pump and enabled the dredge to handle an average of 21,000 cu. yds. per day. Fuel consumption, including oil for a 300-kw auxiliary generator set, averaged 3000 gallons per day, a gallon of fuel for each seven cu. yds.

After initial break-in on her first major assignment, the *Port Arthur* averaged 28,517 cu. yd. per day for a 20-day period, more than 35% above the average of the old equipment. Fuel consumption was 2604 gallons per day, a gallon for each 10.9 cu. yds. This represents a 56% saving in fuel consumption. During a six-day period the repowered *Port Arthur* handled a total of 206,496 cu. yds. at a total fuel consumption for all three engines of 16,478 gallons. This is an average of 34,416 cu. yds. per day at an average daily fuel consumption of 2791 gallons. Thus, production was increased 64%, and production per gallon of fuel gained more than 75% from seven cu. yds. per gallon to 12.3 cu. yds. per gallon. On its peak day, the *Port Arthur* handled 43,835 cu. yds., yet consumed only 3090 gallons of fuel, an average of 14.1 cu. yds. per gallon and more than double former fuel efficiency. It should be noted that figures cited include the fuel consumption of the ship service diesel generators.

**Chief Engineer Bienvenu checks Alnor pyrometer. Also on the guage board are visual and audible alarms on water temperature and oil pressure, a Weston tachometer, Meriam crankcase vacuum gauge, and Lonergan pressure gauges.**

Among reasons for modernizing the 26-year-old dredge was the desire to cut operating time on each job, thereby assuring completion by the date specified and limiting the cost of labor. On government assignments, a penalty of $100 to $200 is incurred for each day that a job extends beyond the contract date. It was to avoid such penalties that the *Port Arthur* was given her first major assignment after conversion. On May 15 she arrived at the Sabine Pass main ship channel, outside of Port Arthur, Texas, to aid the 20-in. dredge *Natchez* in deepening the channel to 40 feet and widening it to 400 feet. The *Natchez*, also a McWilliams rig, had been delayed by heavy ship traffic, which forced her to break her pontoon line at frequent intervals. With her limited capacity, it was certain that the *Natchez* would not complete the assignment on schedule.

Captain Archie Cole reports that bank conditions at the Sabine Pass channel limited the new engine in its potential. With a greater bank, he believes that the 2800-hp diesel will easily handle 50,000 cu. yds. per day and more. Another important fact learned from this initial assignment is that the Nordberg engine operates at progressively higher efficiency as the dredge's pontoon line is lengthened. At the Sabine Pass channel, the *Port Arthur* operated with a pontoon line that averaged 1600 ft. in length. Chief Engineer Robert J. Bienvenu reports that at no time did the new diesel give any trouble and there were no forced shutdowns of any kind.

The new engine is a 16-cylinder, 13 in. x 16½ in. V-type Supairthermal diesel, rated 2800 hp at 380 rpm for this service and equipped with an exhaust gas driven turbocharger and intercooler. At full 514 rpm this type Nordberg engine is rated 3660 bhp. It is direct-connected through a spring-type flexible coupling and thrust bearing to a 24-in. centrifugal pump, designed to operate with impellers of varying diameters. The *Port Arthur* normally uses 68-in. or 71-in. impellers in this unit. Suction diameter at the pump is 28 in.

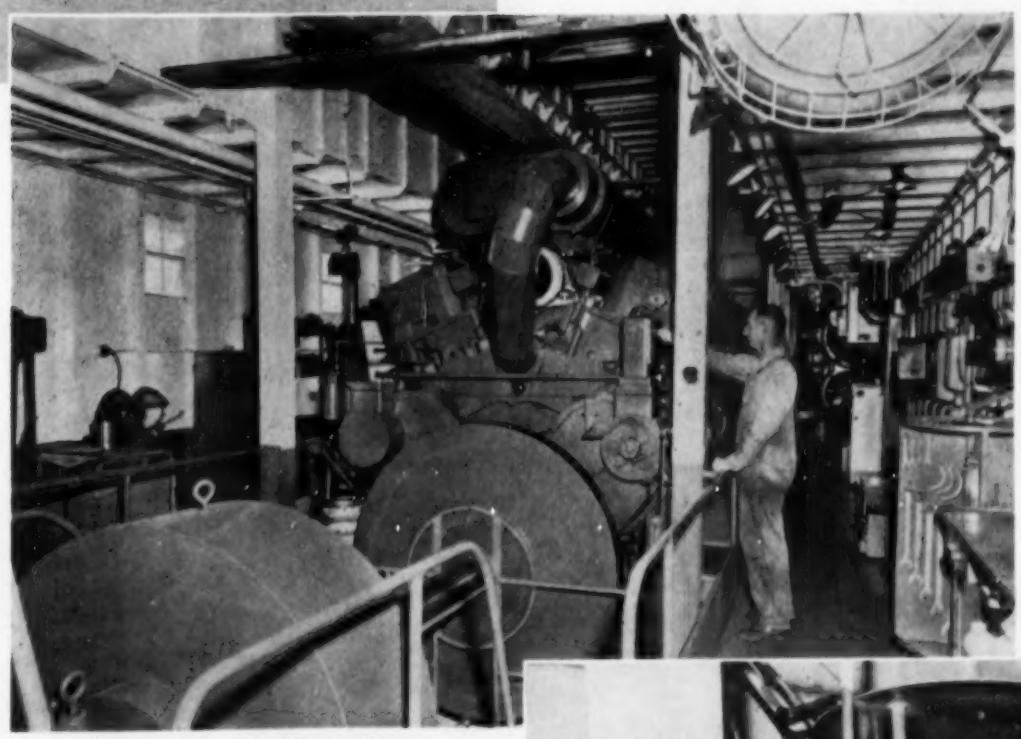
Fuel oil is stored amidships in four bunkers, having a combined capacity of 33,000 gallons. It is drawn from storage by an engine-driven supply pump on each diesel and is sent to a single overhead day tank, equipped with an overflow back to storage. From the day tank it flows by gravity to the engine, passing through a duplex filter before reaching the separate header serving each bank of cylinders. A high-detergent type lube oil is circulated through engine by a 400-gpm pump driven by a 30-hp motor. Triple filtration is provided. A twin mechanical filter is installed on the suction side of the circulating pump, a full flow strainer on the discharge side and in addition there is a cellulose by-pass conditioner, equipped with a small motor-driven pump which draws a continuous supply of lubricating oil

cooling is provided to reduce the temperature of jacket water to 90°F, after which it goes to the intercooler and then to the lube cooler. Separate oil coolers also are provided for turbocharger and thrust bearing. Turbo oil is filtered in a duplex filter, similar to that installed in the fuel oil line. A filter is also provided on rocker arm oil.

Starting air at a pressure of 250 lbs. is drawn from the dredge's compressed air system. This system is supplied by a two-stage 7x6x6 compressor, V-belted to a 20-hp motor. Air for the vessel's pneumatic controls on spuds, swings, anchor booms, ladders and winches is drawn from the same system, reduced to 175 lbs. by a step-down valve. Installed at the rear of the engine is a standing gauge board, arranged for easy visibility from the control station. On it are pressure gauges on starting air, jacket water, lubricating oil, fuel oil, turbo air and turbo oil. In addition there are push-button controls for the crankcase vacuum pump, the turbocharger lube oil pump, plus a tachometer and multi-point exhaust pyrometer. Visual and audible alarms are provided on jacket water temperature and lubricating oil pressure. Exhaust gases are expelled through a vertical snubber.

## List of Equipment

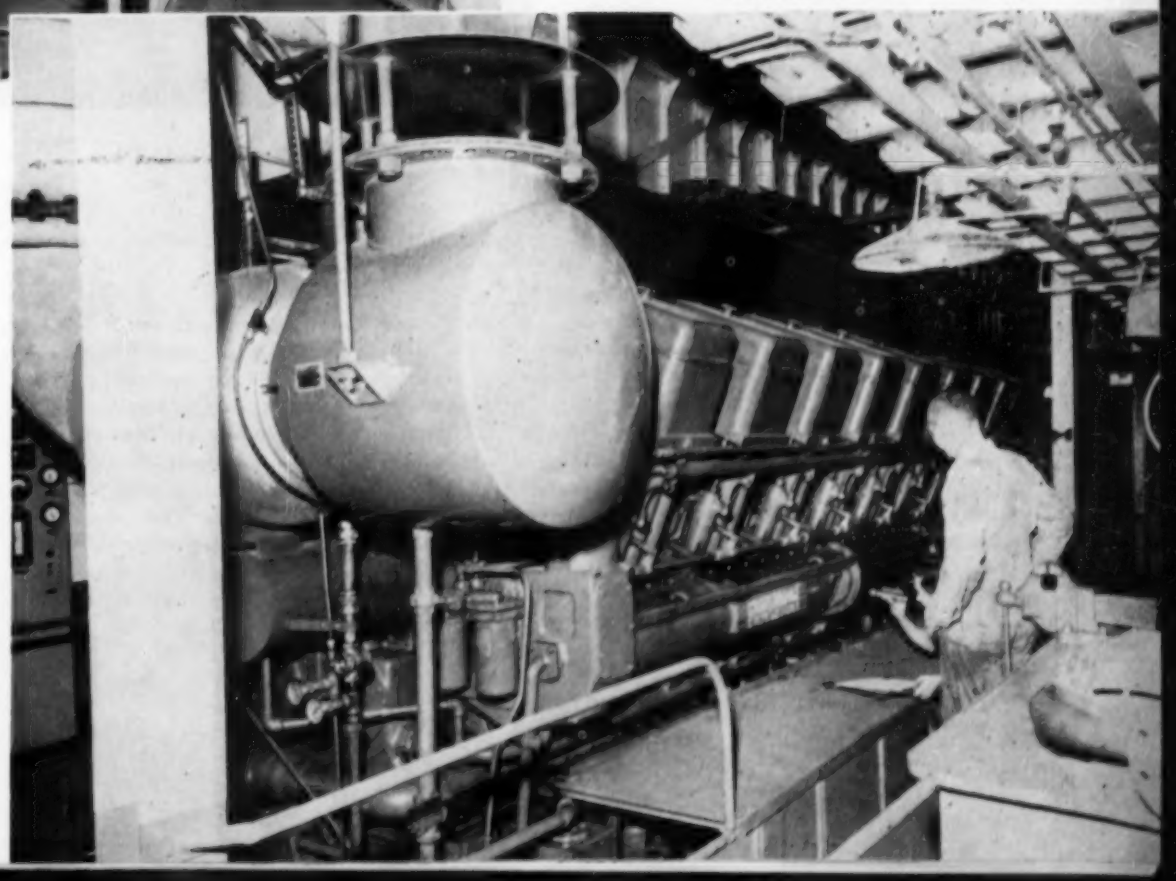
Main pumping engine—Nordberg four-cycle, 16-cylinder, 13 in. x 16½ in. V-type Supairthermal diesel, rated 2800 hp at 380 rpm.
Main pump—Ellicott.
Flexible coupling—Falk.
Thrust bearing—Kingsbury.
Governor—Woodward.
Safety control and thermostatic valve—Fulton-Sylphon.
Turbocharger—DeLaval.
Intake snubber—Burgess-Manning.
Turbo oil filter—Nugent.
Turbo oil cooler—Young.
Thrust bearing oil cooler—Kewanee-Ross.
Fuel oil unloading—Roper.
Fuel oil duplex and rocker arm oil filter—Nugent.
Fuel oil injection pumps—Bendix-Scintilla.
Lube oil circulating pump—DeLaval.
Lube oil twin and lube oil full-flow strainers—Elliott.
Lube oil conditioner—Winslow.
Lube oil by-pass pump—Haight.
Jacket and raw water pumps—Allis-Chalmers.
Jacket water heat exchanger and lube oil cooler—Kewanee-Ross.
Gauge board—Nordberg.
Pressure gauges—Lonergan.
Exhaust pyrometer—Alnor.
Tachometer—Weston.
Crankcase vacuum gauge—Meriam.
Main air compressor—Worthington.
Auxiliary air compressor and pneumatic lever controls—Westinghouse Air Brake.
Exhaust snubber—Burgess-Manning.
Cutter shaft motors—Westinghouse Electric.



**Chief Bienvenu adjusts Woodward governor on the new 2800-hp Nordberg diesel pumping engine. The engine has a Nugent duplex fuel oil filter and Winslow lube oil conditioner. The fuel injection pumps are Bendix-Scintilla. The Falk flexible coupling and a part of the Kingsbury thrust bearing are shown. The bearing oil is cooled by a Ross unit.**

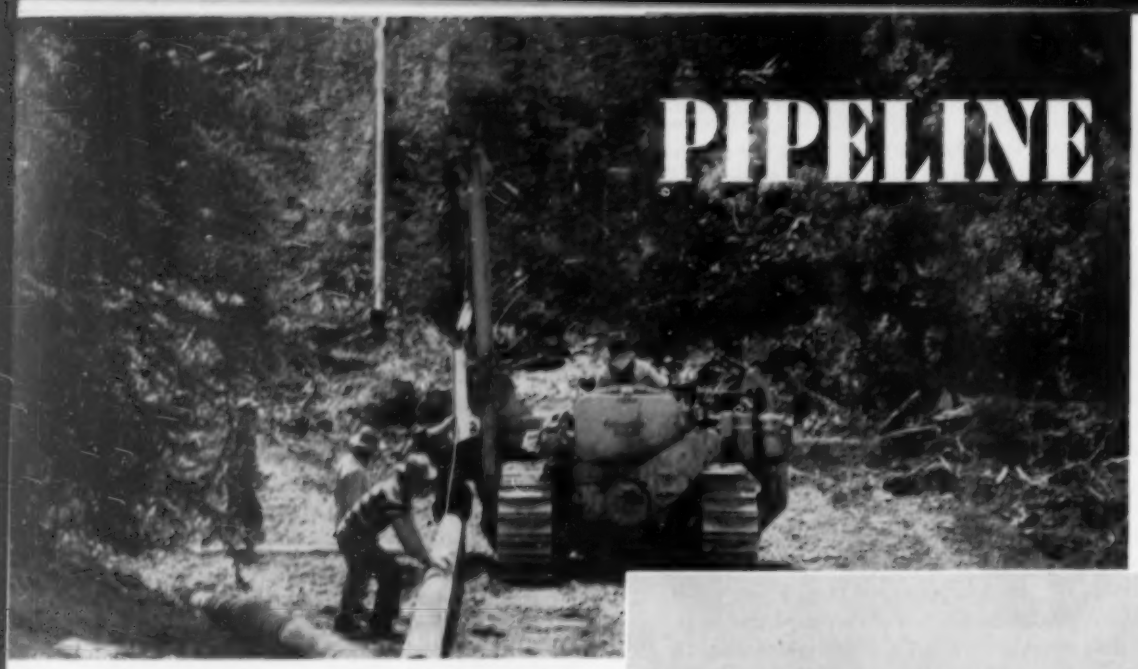
from the crankcase. Cooling is accomplished in a shell-and-tube type cooler.

Jacket water is circulated through the Nordberg's closed system by a 660-gpm pump, driven by a 20-hp motor. It is circulated first through a thermostatically-controlled proportioning valve and then through a shell-and-tube heat exchanger. To avoid salt water leakage, jacket water from the heat exchanger is also used to cool both lube oil and scavenging air. Salt water is used only in the heat exchanger. A 1300-gpm centrifugal pump, driven by a 20-hp motor, draws salt water from the dredge's sea chest, circulates it through the heat exchanger, and then discharges overboard. Sufficient



**The dredge's 16-cylinder Nordberg Supairthermal diesel has a DeLaval turbocharger and Burgess-Manning intake snubber. Other accessories include Ross lube oil cooler and a Young turbo oil cooler.**

# PIPELINE IN ALASKA



A Caterpillar D6 tractor with a pipe layer sideboom is shown working on bending operations in the pipeline construction between Haines and Fairbanks, Alaska. Note the rugged terrain.

Two Lincoln welding machines are mounted on this D6 tractor. This sec-

"THE unusual is usual in Alaska," it's said. That certainly is true in the construction of a 625-mile, eight-inch military products pipeline from Haines to Fairbanks by Williams Brothers Company of Tulsa, Oklahoma. Before clearing operations ever started, the unusual was happening. Williams Brothers ordered a package of Caterpillar equipment for the job from Northern Commercial Co. and the entire order was shipped by water from Peoria, Ill., to Alaska. It traveled a record 8000 miles by water to reach its destination.

This $30 million military project has just been completed, but the story of its construction is well worth telling. The first load of 50,000 barrels of diesel fuel went through the pipeline recently, as a test. After further tests, the contractors turned the line over to military authorities during the month of September, 1955.

Clearing work was done by Oaks Construction Co. under subcontract from Williams Brothers. A crew of two Cat D8 tractors and 'dozers started this operation on Birch Hill; a point in Ladd Air Force Base, near Fairbanks, early in 1953. Since there was only three hours of sunshine daily, the crew pushed hard. January 1, two more crawlers were brought on the scene. Each worked in the opposite direction out of Tok, Alaska, and another worked from the Canadian border near Scotty Creek, towards Fairbanks. The crews cleared about a mile per day each. During February, the temperature nose-dived. There were 15 days when the thermometer read from minus 30 to minus 60 degrees. During this spell, only one crew worked. This two-tractor unit, under the supervision of Slim McMahon, had a unique system for keeping operators warm. The operators were covered with tarps so that the heat of the engine would be directed on them. At night, the entire tractors were covered with tarps weighted down with large rocks. Eight No. 2 kerosene lanterns maintained sufficient warmth under each tarp to make starting of the tractors easy in the morning. No unusual trouble occurred during the cold snap, and no breakage on the tractors was noted.

The Williams Bros. pipeliners were under the direction of Red Davis, general superintendent of the Alaskan section. The men laid one of the best welded pipelines that has ever been attempted, even though the 625-mile route from Haines to Fairbanks traverses some of the roughest terrain in Alaska and Canada. Mountains, swamps, muskeg and river crossings are frequent. Then there are the mosquitoes to make working tougher. There have been three distinct crops of the pests. First came the large, super giant-size followed by two smaller varieties, all excellent biters.

On April 1, all equipment for the Alaska section arrived at Valdez on the *Henry Stevenson*. Included were 40 miles of pipe from National Tube, trailers, camp equipment, tractors, welders, etc. Pipe was hauled by Alaska Transport Co. over the Richardson Highway from Valdez to Fairbanks and stockpiled every five miles along the Alaska Highway. Grading the 50-ft. right-of-way started April 1, at Fairbanks, and stringing pipe commenced April 13. Just six days later, on April 19, the first welding began. One hundred fifty joints were fastened that first day. On July 22, 536 joints were layed up. The welders average two miles per day, but have laid four miles per day. Another most unusual aspect was the fact that there were five sets of inspectors on the job. Close inspections were made by (1) Army Engineers, (2) Civilian Army Engineers, (3) District Engineer from An-

# Diesels Build Pipeline Despite Rugged Terrain, Frozen Earth and Muskeg Swamps

tion of the pipeline is near Dot Lake, Alaska.

chorage. (4) Civilian district Army Engineer and (5) Contract Isotope, to make certain the joints meet standards necessary for the unusual weather.

The pipeline crosses the Alaska Highway eight times between Fairbanks and the Canadian border. In the maneuver area around Ladd and Eielson Air Force Bases, 110 miles of this new pipeline is buried as is a 40-mile section from Haines, north. The balance of approximately 300 miles of the Alaska section is now above ground. Ninety percent of the route is tough going. Most ridges are comparatively easy, but on the high ridges permafrost is found in shady sections. There is no tougher digging than permafrost except glacier and solid rock. Some pipeliners have for years maintained that "you can't dig permafrost with a ditcher." However, Williams Bros. must not have heard of this saying, for ditching on this military products line was accomplished with a Cleveland 320 ditcher powered by a Cat D8800 diesel engine. A few changes were made; a smaller heavy duty wheel was used and two more "Jiffy" buckets were added (making a total of 14). Five and six-inch "Jiffy" rooter teeth were placed alternately on each bucket.

It's a slow process, but the rooter teeth keep chipping away at the permafrost and after a bit, there's more ditch than there was before. A set of new teeth was used every shift. A lead Cat crawler tractor with 300 feet of 7/12-in. cable helped drag the Cleveland ditcher from Fairbanks. A typical spot where the ditcher crew works is in huge muskeg swamps. About a foot down through the moss-like muskeg and grass is the tough permafrost. In some spots the frost is 30 inches down. The entire area is covered with water and not even the moose venture in. These swamps are considered the toughest part of the entire project. The Cat crawler tractors can proceed slowly if they keep going. It takes very skillful operators to keep from miring down. Once a tractor slips through the soft upper layer it bogs down on the frozen ground below. In this mess the men ditched 3500 feet in 24 hours. Boom-equipped crawlers delivered river clamps, cement blocks weighing 480 pounds per set. Muskeg blocks have the same weight and have an eye hook for ease in handling.

When the ditcher dumps the permafrost to one side, the ice soon begins to thaw, producing slush. This, coupled with the swampy muskeg, makes for extremely difficult crawler operation. But if it's tough for a crawler, imagine the pipeliners on foot. Davis explains that this project was extremely well planned, and that going was tougher than was expected. The contract for the Haines to Fairbanks pipeline was bid by a joint venture consisting of Williams Brothers, McLaughlin, Inc. of Great Falls, Montana, and Marwell Construction Company, Ltd. of Vancouver, B.C.

Pipeline work was sublet by the joint venture to Williams Brothers and pump stations and terminals sublet to Marwell. Williams Brothers sublet loading and hauling of pipe to Alaska Transport, sublet clearing and grading of right-of-way to Oaks Construction Company, and sublet feeding and housing services to Canus Services, Inc. of Seattle, Wash. The Canadian portion of the pipeline construction was sublet by Williams Brothers to Williams Brothers Corporation, Canada, Ltd. Alaska Transport, Oaks Construction and Canus Services were also subcontractors for Williams Brothers.

A Cat D8800 provides power for the Cleveland ditcher south of Shaw Creek, Alaska. The Bucyrus-Erie back hoe is powered by a D315.

Emergency lighting and control power at Andrews Air Force Base is supplied by two supercharged Baldwin-Lima-Hamilton diesels. They are equipped with Elliott turbochargers, Maxim exhaust snubbers, Air-Maze air filters, and Woodward governors.

# USAF COMMUNICATIONS NETWORK RELIES ON DIESELS

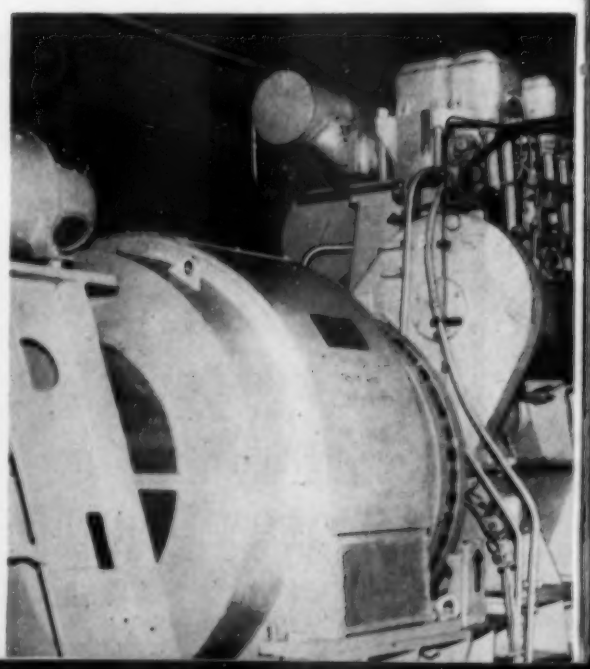
## A CIVIL DEFENSE INSTALLATION

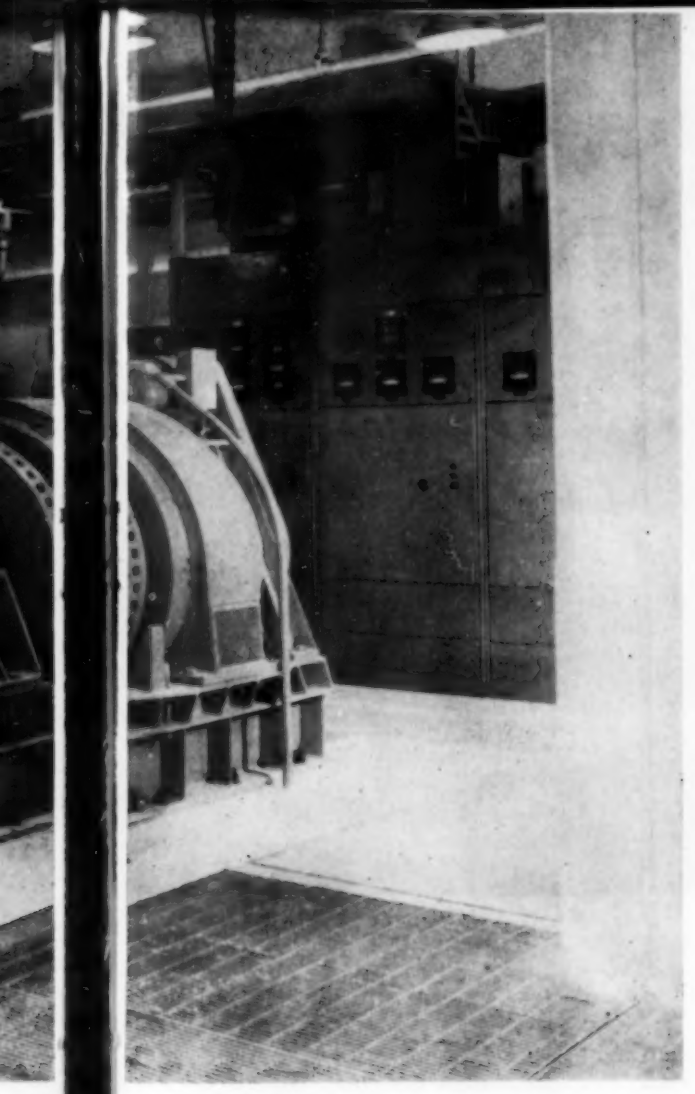
ELECTRICAL power is the lifeblood of the USAF Strategic Communications System, a series of radio communication stations being installed around the world to serve the Strategic Air Command. The chain is so complex that the slightest interruption to the electrical supply at any one of the major sites can seriously upset the entire system. Thus, it was imperative that the Airways & Air Communications Service, Andrews AFB, Md., investigate and study every possible source of power from the standpoints of instant "readiness-to-go" and maximum dependability. The final outcome of this study was to use diesel-electric generation at all of the sites, in some instances as the sole source of power and, in others, as back-up protection to local utility service.

The local utility service will be used whenever its characteristics—frequency, etc. — are compatible with the communication system design. This appears to be possible in only 25 per cent of the installations; the other 75 per cent being served entirely by diesel-electric generation. Considering the fact that most of the stations, extending like a belt around the globe with tributary stations feeding in at various points—are being located thousands of miles from home base, it is apparent that many diversified problems affect the design of the diesel plants. This work is handled by a central organization for communications and operations.

One important requirement of the system is that plant basic design comply with standard specifications so they would be identical from an operating standpoint. This is necessary because operating personnel is trained in the States before being transferred to the operating site. Every trainee must, therefore, be capable of stepping into any of the plants and carrying out his assigned duties without further instructions. This requirement added numerous complications to the planning because precautions against climatic conditions had to be worked into the standard design. For instance, this meant incorporating both inside and outside air intakes in each station because the inside intake is needed in extremely cold climates, and in desert areas to protect the engines against dust storms. Similarly, the engine radiator fans are equipped with reversible propellers so the waste heat can be used for building heating when needed. The outside air intake uses an oil-bath filter and the inside one a dry-type filter.

Since all generating plants follow a standard pattern of design, they are all similar to the Andrews Air Force Base in the United States and a description of it will apply to the others. Each station





consists of three facilities or sites; one for reception of messages, a communications relay center and a transmitting site, all widely separated. Andrews Air Force Base is the pattern or pilot station and went into operation late in 1952. Construction of the remaining sites is still progressing along plans formulated after 1949. At Andrews, prime power for operation comes from the local utility with diesel-electric generators for emergency use.

The communications relay center uses two 6-cylinder, Model 606-A, 12¾ x 15½ in., 4-cycle, turbocharged diesels rated 875 bhp at 514 rpm, built by Baldwin-Lima-Hamilton Corp. The number of diesel generating units in each site varies according to the site load. There is always enough spare capacity to pick up the load if the prime source fails regardless of whether it is utility or diesel generation. Some sites have only two engines while others have as high as seven. A total of 63 Baldwin engines have been ordered for installation in the communications relay centers and transmission facilities, 22 of which have already been installed. Each engine drives a Westinghouse 750-kva, 3-phase, 60-cycle, 4160/2400-volt generator. The generated voltage is stepped down to 120/208 through service transformers for use in communications.

At this station the utility permits parelleling the diesel generators with its system for picking up the communications load so there is very little chance of any appreciable service interruption. In case of an electrical storm the diesels can pick up and carry the load. This also facilitates giving the engine-generators their 4-hour weekly service run without interrupting the power supply even momentarily.

Paralleling is done on the low-voltage side and reverse power relays prevent interchange of power into the utility system. Time-overcurrent relays protect against faults on the utility feeder, and no-voltage relays cut the feeder out if utility voltages fails. Current balance relays protect against unbalanced currents in excess of 25%. The diesel generating units can be started and ready to carry load within 45 seconds.

Fuel storage at the sites is usually enough for 45 days operation. At Andrews Air Force Base relay center storage consists of two 25,000 gallon tanks. From these the fuel is pumped to 150 gallon day tanks at each engine. The fuel used, which is purchased to government specifications, is comparable to #2-D oil. All oil is passed through a centrifuge before delivery to the engines. Engine cooling is taken care of through forced-air cooled radiators fitted with thermostatically-controlled shutters, which maintain engine temperatures at 140 to 160 degrees F. The radiators, with their reversible-blade propeller fans, are installed in one of the outside walls so the waste heat can be exhausted to the atmosphere, or fresh outside air brought in and warmed for building heating and engine intake. Softened make-up water is stored in a 600 gallon service tank. Station control and emergency lighting is served by two 125-volt storage battery sets equipped with charging rectifiers. Facilities are installed for centrifuging the engine lube oil continuously or in batches. For the latter method, two 300-gallon storage tanks are available.

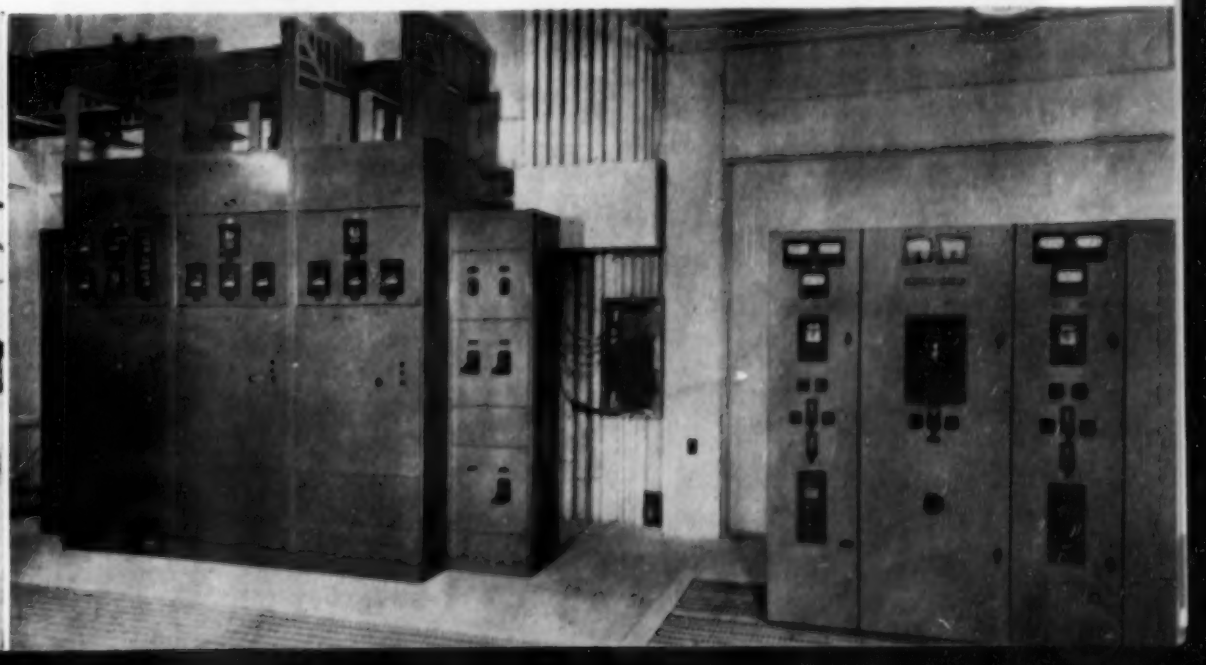
The manpower pool required to operate the great number of diesel plants in this far-flung undertaking is tremendous. Training the men is an endless job because almost as fast as trainees are added to the pool they disappear in replacing others due for a transfer back to the States or those eligible for discharge from the service. To keep up with the demand for operating personnel as new stations go into operation, numerous schools have been organized to function until the Air Training Command can get its main training center organized.

The intensive training of the operating personnel plus the "ready-to-go" service provided by the diesel-electric units has eliminated many of the headaches usually encountered in placing such an involved system into operation. The diesel engines have proven their dependability in every instance, especially in the isolated locations where a breakdown might delay communications for days.

## List of Equipment

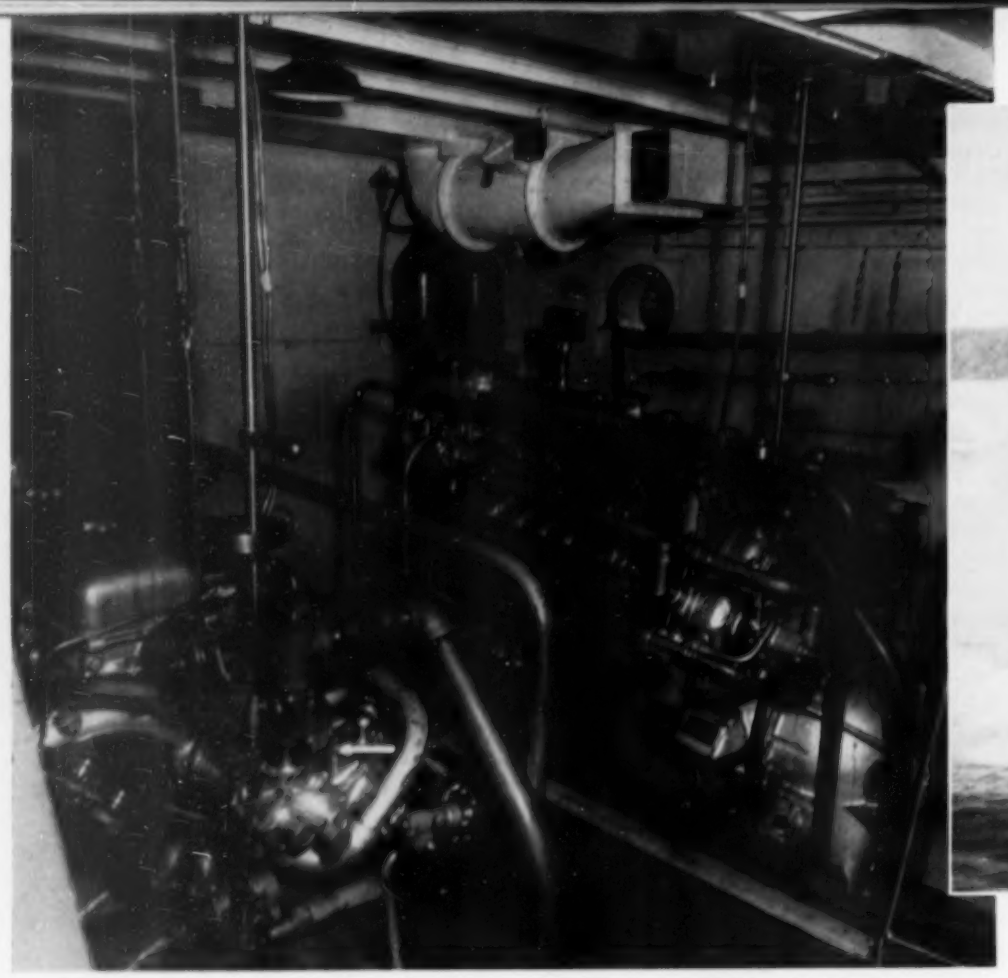
Diesel engines—Baldwin-Lima-Hamilton Corp.
Generators and switchboard—Westinghouse.
Turbocharger—Elliott.
Exhaust snubbers—Maxim.
Governors—Woodward.
Station emergency battery—Exide.
Fuel oil strainers & filters—Commercial.
Fuel oil service pump—Walter Eagen.
Fuel oil centrifuge—Sharples.
Air filters—Air-Maze.
Lube oil filters—Hilliard.
Lube oil cooler—Ross.
Oil tank level indicators—Liquidometer.
Engine cooling radiators—Young.
Starting air compressors—Gardner-Denver.
Control & alarm devices—Fulton-Sylphon.
Pyrometers—Alnor.

**The generator behind this B-L-H diesel is a Westinghouse. Fuel oil strainers and filters are Commercial; centrifuges, Sharples; lube oil filters, Hilliard; lube oil coolers, Ross.**



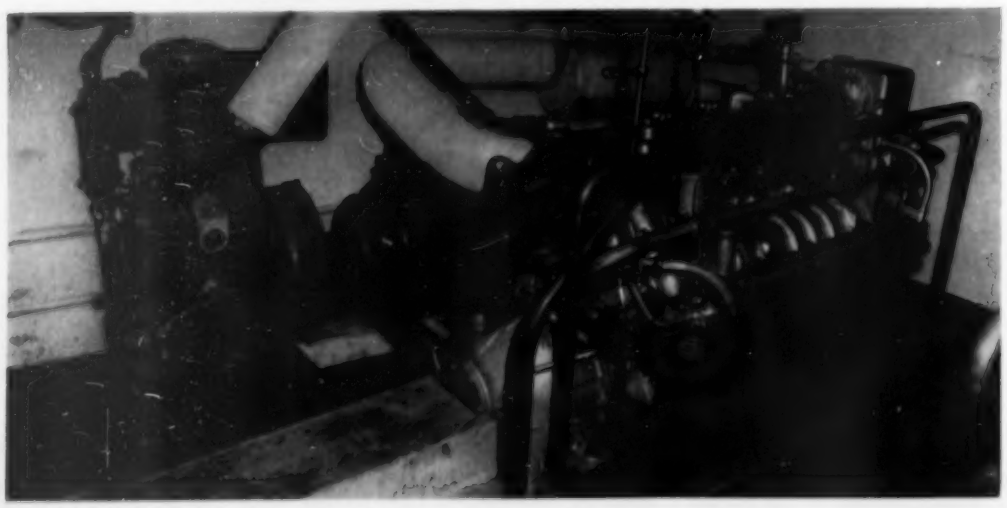
**Westinghouse switchgear panels contain all the necessary facilities for paralleling the diesel units with the outside power source. Each generator has an automatic regulator for close voltage control. Some military communications relay centers have as many as seven diesel-electric emergency sets, although there are two at Andrews AFB.**

# DIESEL



Engine room of the yacht *Holiday*, showing the two GM 6-71 propulsion diesels. Each engine develops 165 hp and drives a Coolidge propeller through a Walters Marine V-drive.

View of the Fairbanks-Morse 7½ kw auxiliary diesel generator set and one of the GM 6-71 diesels in the engine room. The *Holiday* has plenty of room in the engine compartment.



The pilot house controls include engine controls and instrument panel, and full steering control, making it possible for one man to steer and operate under all conditions.

OF all the times the word "functional" has been bandied about by architects, engineers, decorators and even the arty-minded folks, with little of its true meaning visible to the average eye, there are few clean examples in cruiser and yacht construction worthy of note. At last a perfectly designed, beautifully appointed family yacht of the medium-large class has been completed and put into service, and "functional" is the proper and almost exact word to describe it.

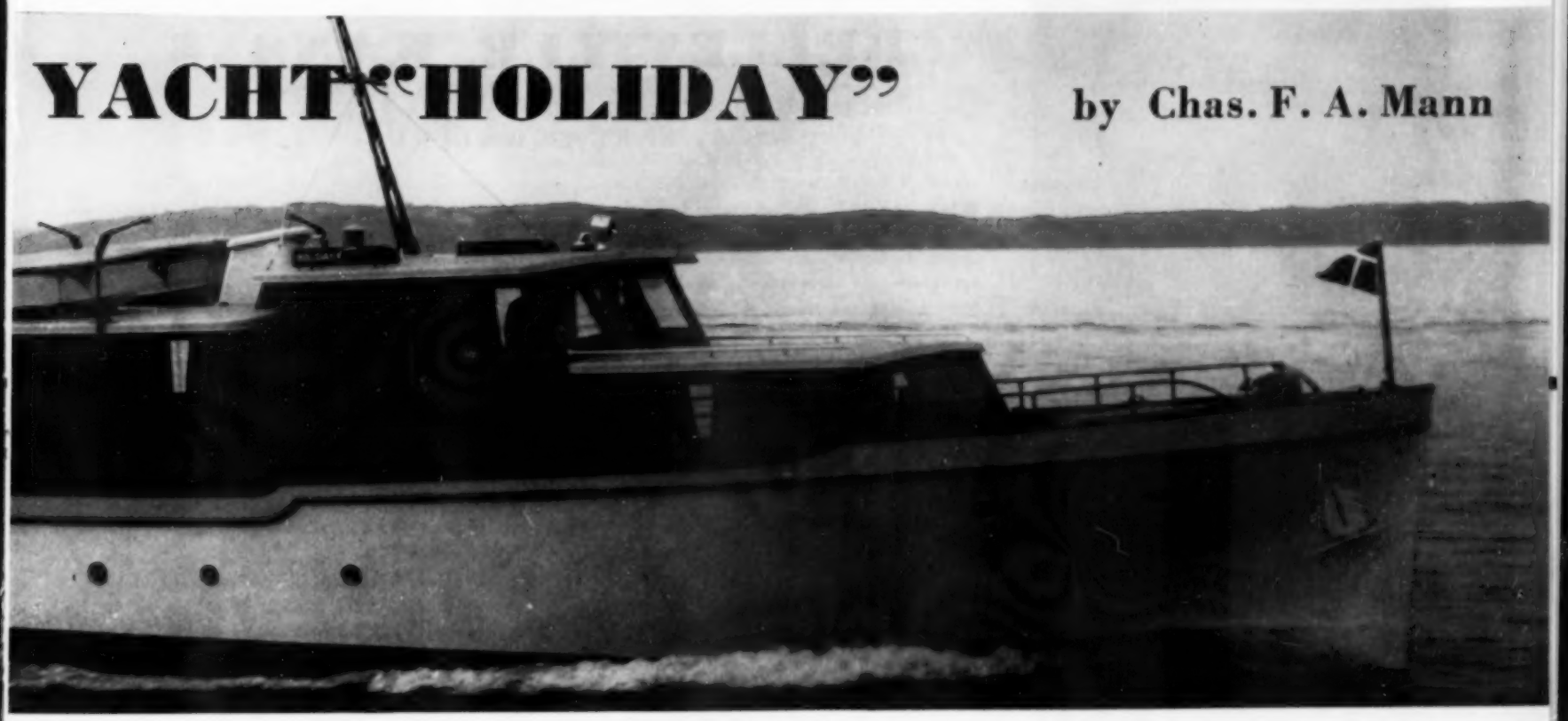
Newest member of Tacoma Yacht Club's fleet, this outstanding vessel is the diesel yacht *Holiday*, designed, constructed, and owned by Arne Strom, owner of Tacoma Boatbuilding Co., Inc. Last winter, Mr. Strom got the idea to kill several birds with one stone. He put up his diesel yacht *Olympus* for sale and began laying out plans for creating his "Perfect Yacht." Some time before, he had picked up as surplus an Air Sea Rescue Boat at Newport News, Va. and had it moored at the long outfitting dock waiting for something to turn up.

On this husky wood hull was based the idea of creating a fairly large, roomy yacht that could easily be handled by the owner and one or two crew members, that could go to sea or go north through the inside passage to the remote corners of the North American fjord country of British Columbia and Alaska, or that could just take a party of visiting firemen out for an evening or Sunday cruise on Puget Sound. Besides all this, it must be a perfect fishing ship equipped to bring home a large catch of salmon.

So, the *Holiday* was born in the mind of a practical man, Mr. Strom, who has had 25 years experience in wood and diesel boat-building and many years

# YACHT "HOLIDAY"

by Chas. F. A. Mann



**The newest member of Tacoma Yacht Club's fleet, the *Holiday*, was built by Tacoma Boatbuilding Co. Full pilot house controls, a pair of 165 hp GM diesels swinging twin propellers, and functional, yet roomy design makes it a real yachtsman's craft.**

besides as a commercial fisherman and private yacht owner. The old Rescue Boat hull was towed to the nearby plant of Pacific Boatbuilding Company, a subsidiary of Tacoma Boatbuilding Company, and stripped down to the heavy ribs and planking, with all the machinery removed. Then the new ship was created inside and all the functional, horse sense planning from a lifetime in the business was put into the craft.

*Holiday* has an unusual interior arrangement that points to the single object of laying out an 80 foot long yacht to comfortably take care of a family of three or a party of 50. Forward is one of three toilet rooms, this one located in the sharp-angled forepeak, just behind the chain locker. This is followed by a roomy double stateroom with separate door leading aft and up into the main living room, which is a beautiful room that would fit in the finest of homes. Constructed atop the tank storage space, with floor line about halfway between the line of floors in the lower deck and the floor line of the upper deckhouse, this beautiful living room has picture windows on three sides, deep pile carpeting, and modern light wood panelling on walls and ceilings that hides all beams and gives a waxed piano finish to the excellent veneer grains.

Beneath the living room are tanks for 1400 gallons of fuel oil: 1000 gallons of fresh water and a small lube oil storage tank. The bulkheads of this space, beside sealing off the tank compartment, create a watertight bulkheading forward.

Leading up from the big living room is a short stairway going directly into the large pilot house-chart-radio room. Here the space where everybody wants to squeeze in is again 100% functional, and besides serving as an inside passageway from the forward compartment and living room, it is a complete one-man control station for the captain. Engine controls for the two main diesels, instrument panel from the engine room, lighting switches for the key circuits, compass and 65 watt ship-to-shore Intervox radio, besides a chart table and roomy seats for spectators, all make this the center of the whole ship.

Below the pilot house, and through a center stairway leading down from the living room, are two double staterooms, locker space, a roomy tiled bath and the larger owner's suite, running full width aft. Back of the pilot house on the main deck is the galley and dining room, where all food preparation and storage is arranged on the functional system used in tuna clippers. Directly aft of the galley is the shelter deck with low sides, where most of the people will sit in the evenings or on a warm day.

Because the hull is broad from the middle aft, and it has a big, high square transom stern, what was not possible 10 years ago when diesel engines were big and heavy, is accomplished with lightweight, high speed diesels in the *Holiday*. The entire power plant and extra large storage battery set are placed far aft just like in a modern express cruiser, and the V-angle drive is utilized to conserve space.

A pair of 165 hp, 6-71 GM diesels power the *Holiday*, and they are placed almost directly under the after deck, and close to the bulkhead separating the living quarters from the small engine compartment. This location serves to seal off the ship's power plant in a semi-soundproof compartment remote from all living quarters and directly below the area where everybody gabs and walks around and makes more noise than the machinery. The entire rest of the ship is thus free of machinery and shafting and attendant noise, fumes and dirt. The GM diesels each swing a 5 bladed new type Coolidge propeller and drive through a pair of Walters Marine V-drive units. Goodrich Cutless stern bearings are fitted and the plate rudders have zinc blocks bolted to them to eliminate electrolysis. The engines have Burgess-Manning mufflers.

Full pilot house controls make it possible for one man to steer and operate under all conditions. A 115 volt, 15 kw GE generator is bolted to one of the main engines, and it charges a 112 volt Willard heavy duty, high capacity, 56 cell, starting battery set mounted in a separate compartment directly aft of the engine room, and over the propellers. A 7½ kw Fairbanks-Morse diesel generator set is installed as an auxiliary power unit.

A bilge pump driven through a Jabsco clutch is fitted on one main engine. The fire, wash down and emergency bilge pump is a 1½ hp Fairbanks-Morse motor driven unit that can operate off either the batteries or from the main engine. Tacoma Boat built the large main electric switchboard, distribution panel and engine alarm system in their electric shop. The auxiliary electric power capacity is relatively large for the fact that all passenger spaces are heated throughout by automatic electric heat. When the *Holiday* ties up, at a yacht club or moorage, a shore cable and plug-in will operate the heating plant if necessary.

As for performance, the *Holiday* does 12 knots easily and is as sturdy and seaworthy as you will ever find for a pleasure boat of its size.

# BELLEVILLE, KANSAS

*By* EARL E. WHITNEY*

Earl E. Whitney, author of this article.

Three of the five members of the Belleville operating force are shown here. Left to right: Richard Moxham, superintendent; Ival Stutzman, assistant superintendent; J. F. Carmony, relief operator. The operators, Harold Nesmith and Merlin Moorehead, were absent when picture was taken.

BELLEVILLE, the county seat of Republic County, long has enjoyed a prominent position in the development of North Central Kansas. Agriculture and transportation have been the basic activities of the community. These have nutured development of the various allied industries which are required to complete such a modern, industrious city as we now have. Early transportation facilities included the C.R.I.&P. and the Union Pacific railroads, both with terminal facilities at this point. Early highway transportation also favored Belleville by the intersection of the now prominent U.S. 36 and 81 at this "Cross Roads of America."

The story of Belleville growth started with its incorporation in 1878. Then came the C.R.I.&P. railroad in 1888, all in the gas lamp era. But by early 1902, the governing body of the then-thriving city, apparently decided to venture into municipal ownership of utilities by the purchase of the then privately owned water system. We say "apparently" because the city fathers, in 1904, issued a franchise to a private concern to build and operate an electric power plant and distribution system. However, this plan was rather short-lived since they reversed themselves again in 1906 and decided to purchase the electric utility and operate it as a municipal enterprise in conjunction with the water system.

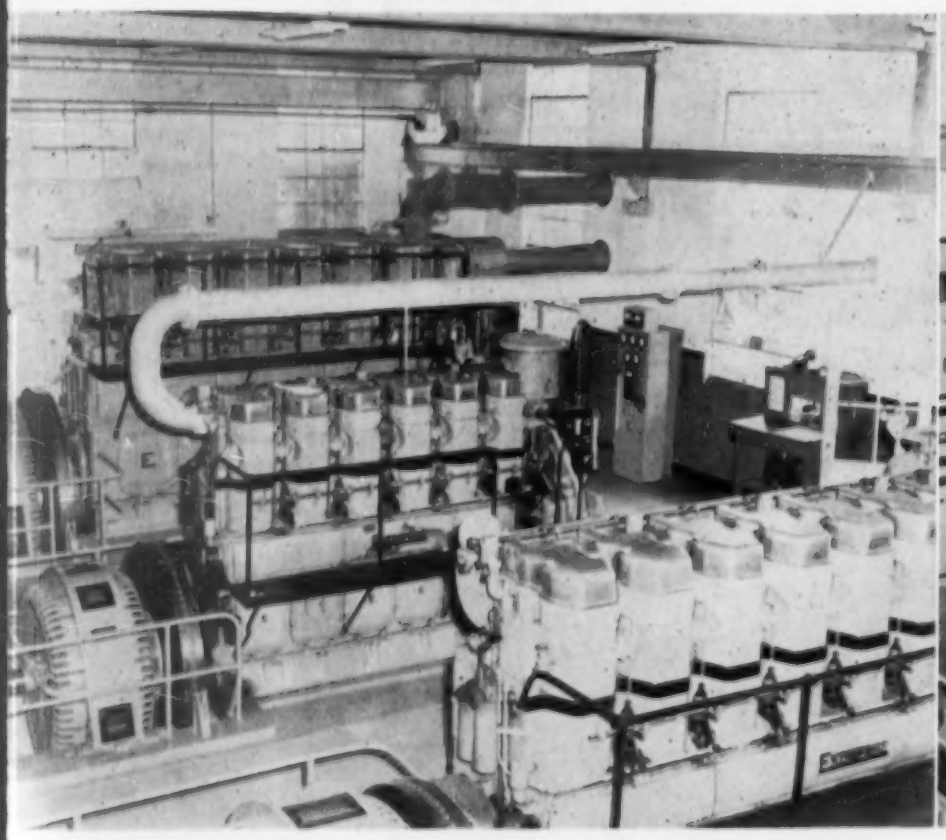
This first power plant consisted of two vertical, oil-fired boilers, two Chuse steam engines, belted to two 75-kw alternators. Within the next few years, the city experienced the usual troubles inherent in early efforts at electric production and by early 1912 a serious decision had to be made,—either continue producing electricity at a sizeable loss, even with a 15c kw flat rate, or change to another type of power which was then very new, the "oil engine."

The decision, to purchase the oil engine, was soon made and the next three years of operation proved the advisability of that decision. The 170-hp Model A Busch-Sulzer diesel, burning the same fuel which was being used for the boilers, saved enough money, through its superior efficiency, to enable the city to pay off the steam plant deficit and reduce rates.

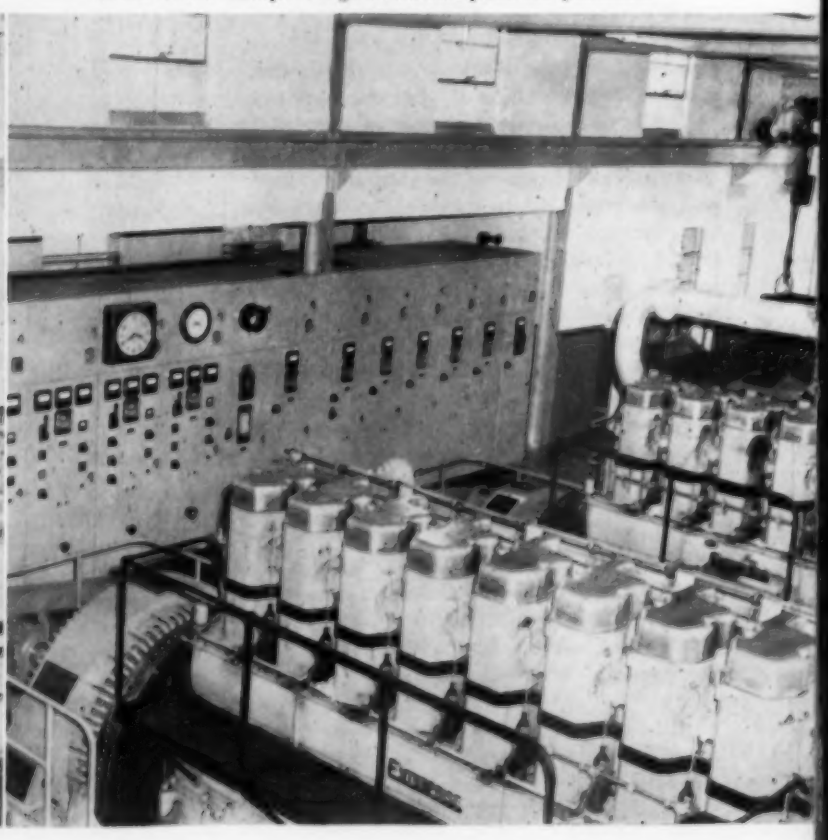
With this experience behind them, it was no problem for the city fathers to decide, in late 1915, what type of power plant equipment they were going to purchase to supplement their three-year-old oil engine. They purchased a 225-hp Model B Busch-Sulzer diesel and disposed of the steam equipment.

*Mr. Whitney is City Manager in Belleville. Formerly he was a diesel engine application engineer.*

Among controls and gauges on the new engine are Woodward governor, Amot thermostatic valves, Allen-Bradley lube oil alarm system, and Alnor exhaust pyrometer. Winslow provided the fuel oil filter, Kewanee-Ross the lube oil cooler, Vortox the air intake filter. A Kittell exhaust muffler was selected.



These Enterprise dual-fuel engines provide city of 3000 persons with 2500-kw electric current capacity. Far engine is 1955 installation and has 1000-kw rating. Two engines in foreground are 1946 vintage and each is rated 860 hp. New acquisition makes fourth Enterprise engine Belleville plant has purchased.



Continual rate reductions and high efficiencies, by early 1923, had caused the need for more capacity at the power plant, so another 250-hp Model B Busch-Sulzer diesel was purchased, thus bringing the total capacity to 445 kw.

By 1929 the load had again reached the point where more power was necessary and the decision was still 100% in favor of the diesel engine, but it was decided to purchase another make of engine. This time it was a 550-hp, 375-kw Model VA De La Vergne diesel, with the 17-year-old original engine being removed—to permit installation of the fourth diesel engine in its place.

By the end of World War II, there was no doubt in anyone's mind that the City of Belleville needed more capacity in its power plant. The 700-kw capacity of 1929 was in a bad way. Early in 1946 the governing body of the city began investigations of possible delivery of additional power for their plant. During these investigations, it was decided that sufficient progress had been made in added efficiencies to warrant another drastic change in the power plant equipment of Belleville, so a complete new power plant was built and three modern diesel engines were installed. At this time, considerable discussion was had with the manufacturer regarding the possibility of conversion of these engines to dual-fuel operations. (New dual-fuel engines were not yet available.) This 1946 installation consisted of one 450-hp DSG-6 and two 860-hp DSH-38 Enterprise diesels—which have long since been converted to dual-fuel operation. It was again evident, by late 1954, that the 1946 capacity of 1500-kw (exactly 10 times the original power plant capacity), was no longer sufficient, so another Enterprise engine was purchased. This time it was a 1455-hp DSGQ-36 1000 kw unit, bringing the 1955 capacity to 2500 kw.

The people of Belleville today are thankful for the foresight of their early civic leaders who decided on municipal ownership of utilities and the use of the diesel engine as a means of making the production of electricity a profitable community enterprise.

Pages of data could be supplied to substantiate Belleville's claim to being one of the very efficient power plants in the Midwest, but the fact that this plant in 1954, produced approximately 1,000,000 kwh of free services, out of a total production of about 4,000,000 kwh, and returned large monetary contributions to various city funds, would appear to be more concrete proof of the high degree of efficiency which prevails in this plant.

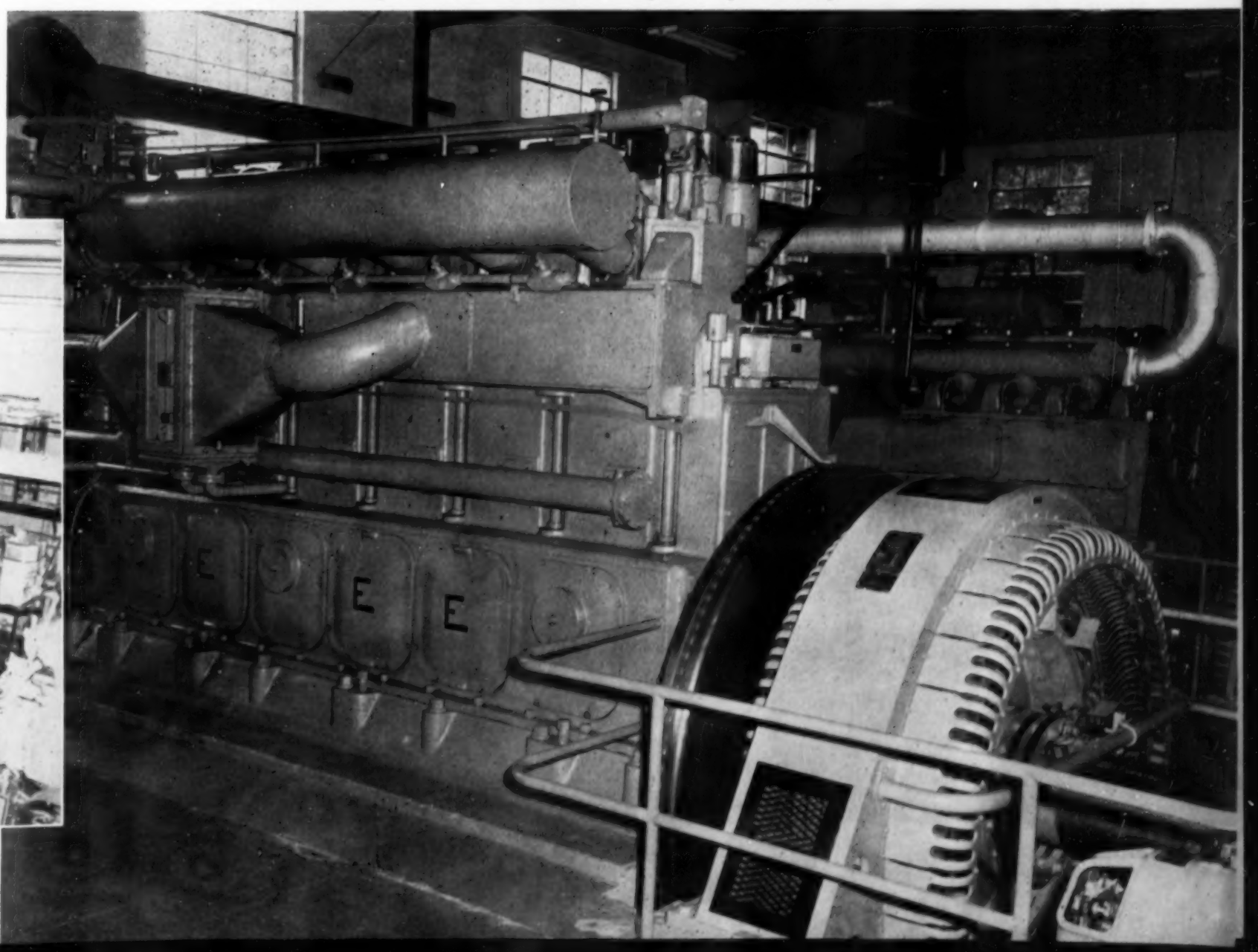
The personnel for operation of the Belleville plant consists of: Richard "Dick" Moxham, power plant supt.; Ival Stutzman, asst. supt.; Harold Nesmith and Merlin Moorehead, operators, and J. F. "Jack" Carmony, relief operator.

## List of Equipment

New engine—Enterprise Model DSGQ-36, 1455 hp at 360 rpm; bore 16 in.; stroke 20 in.; 6 cylinders.
Generator—Elliott 1000 kw; 60 cycles; 2400/4160 volts.
Exciter—Elliott.
Turbocharger—Elliott.
Governor—Woodward UG-32.
Fuel oil used—Socony-Vacuum.
Fuel oil filter—Winslow.
Fuel oil meter—Rockwell.
Fuel oil transfer pump—Worthington.
Lube oil strainer—Bailey.
Lube oil cooler—Ross.
Thermostatic Controls—Amot.
Lube oil alarm system—Allen-Bradley.
Air intake filter—Vortox.
Exhaust muffler—Kittell.
Exhaust pyrometer—Alnor.
Cooling tower—Diesel Service Co.
Consulting engineer—A. J. Lane.

**The new Belleville plant engine is a Model DSGQ-36 Enterprise, rated 1455 hp at 360 rpm. The generator is 60-cycles, 2400/4160 volts of 1000 kw made by Elliott. Both the exciter and turbocharger also are of Elliott manufacture. All engines in the plant are Enterprise.**





# SANITARY LANDFILLING OFFERS OPPORTUNITIES TO CONTRACTORS

*By* W. L. BODE

PARKS, playgrounds, parking lots and airports, land for schools and other municipal and industrial buildings, and sites for housing projects are some of the benefits resulting to communities all over the country from a dieselized approach to their major problems of garbage and refuse disposal. Waste land, such as swamps, marshes, abandoned pits, and ravines—is being turned into valuable property through sanitary landfills. This is the new, low-cost method of curing an enormous community headache.

Municipal officials, pressed by the growing taxpayer consciousness of public health, are increasingly in favor of this way of disposing of garbage and refuse. In the last 15 years, the use of sanitary landfill has greatly increased. This disposal method, because of its low cost, can be adapted for communities of all sizes. The operation of a fill, which is usually started on waste land, basically consists of: 1. Taking the day's collection of refuse and garbage; 2. Spreading and compacting this material to reduce its bulk; 3. Covering the compacted waste with a thin layer of covering daily; 4. Compacting the sealing cover.

There is a wide range of new business for progressive contractors in sanitary landfill. For example, 117,841 communities under 2500 population are possible users of this disposal method. If one contractor would do this work for five communities, it would create 23,568 new business opportunities all over the country. A contractor need only count the towns around him and see the share of business available. Most of these towns and villages operate on limited budgets. They are potential users of the low-cost sanitary landfill method. Often, lack of funds prevents them from purchasing new or used tractor equipment to do the job. Such places can use the services of a contractor to operate their landfill. In many instances, contractors now in business do the job for two or even three towns that are close together.

Three major groups of equipment can be used in landfill work by a contractor. These are a crawler tractor with front-end shovel, crawler tractor with bulldozer blade, and a crawler tractor-scraper combination. The correct selection of equipment depends on the method of landfill operation, characteristics of the site, and size of the community to be served. The tractor shovel is the most frequently used because of its versatility. It is adaptable to the trench, ramp and area methods.

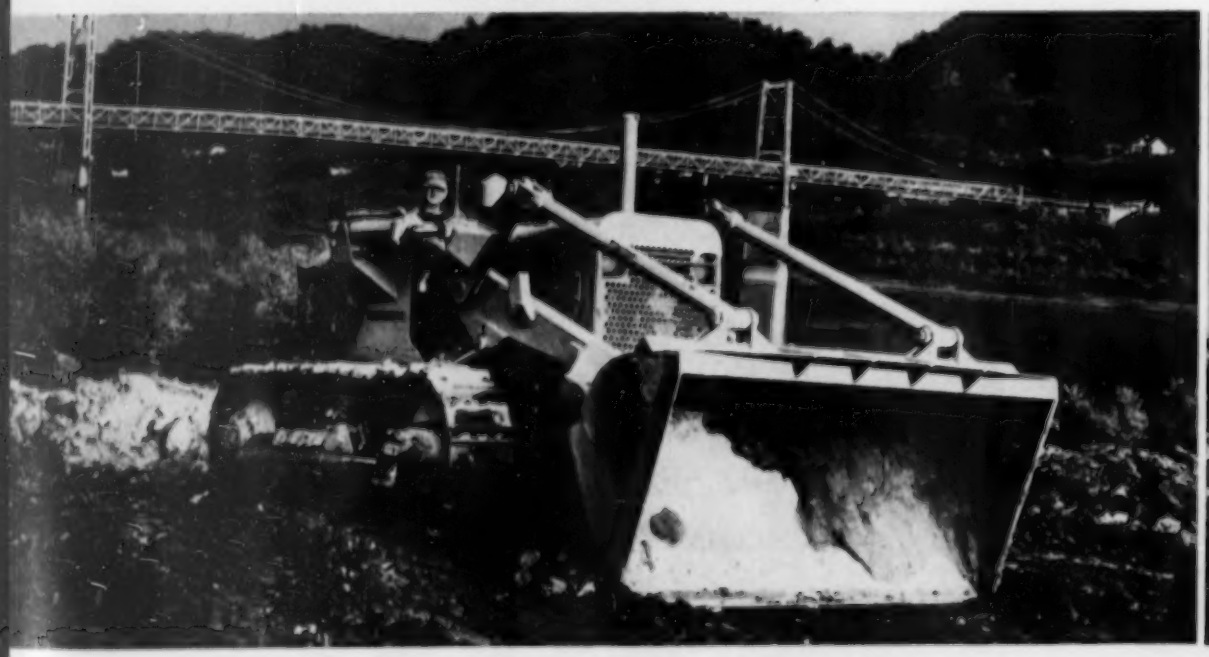
A community of 5000 population or less, for example, would require a 1¼-cu. yd. shovel to work on the landfill about two hours a day. A contractor with his own fill site could handle four or five nearby towns and service each one daily, either with his own trucks or municipal trucks delivering material to the fill. A tractor with a shovel of this size, or a dozer, can service a city up to 35,000 people. A tractor with a 2-yd. shovel or dozer will take care of a city up to 75,000 and two units of this size would be required for a population from 75,000 to 100,000. Tractors with 3- or 4-yd. shovels, or dozers, would meet the requirements of a city of 100,000 or more. Each 100,000 additional population would require one extra unit. Many contractors also may handle home collections of garbage and refuse for one or more communities on a fee basis. The number of trucks required will depend on the size of the community.

Since sanitary landfill requires no special or expensive site, marshland, pits, gullies, ravines, and other waste land are suitable. When it is remembered that a correctly operated landfill is not unsightly or objectionable, the site need not be located in a remote area. It should be easily accessible for haul trucks. Most soils are suitable for landfill, especially sandy soils. Extremely rocky areas or those with gumbo clay should not be selected. Large rocks make it difficult to seal the fill, and clay is subject to shrinkage and cracking as it dries.

There is about one cubic yard of compacted garbage and trash per person per year. Studies on sanitary landfill show that in the trench method, 8000 to 10,000 cu. yds. of garbage can be disposed of in one acre of land per year. As conditions vary on each landfill, a safe method would be to use one acre per year for a city of 10,000 population, where refuse is placed in layers having a total compacted depth of six feet.

In addition to income from the actual operation, sanitary landfill provides profits from a completed landfill site. It can be sold for a profit over the purchase price of the original land because the converted waste land becomes usable for a variety of purposes. In many places, private owners with low-value land have been "sold on" the idea of having their land "built up" in value.

**Here is an example of good sanitary landfill coverage at the end of the day. The blade of the 2-yd. front end shovel on the Allis-Chalmers 72 drawbar hp HD-9 diesel tractor is used to smooth out the area filled for the day.**



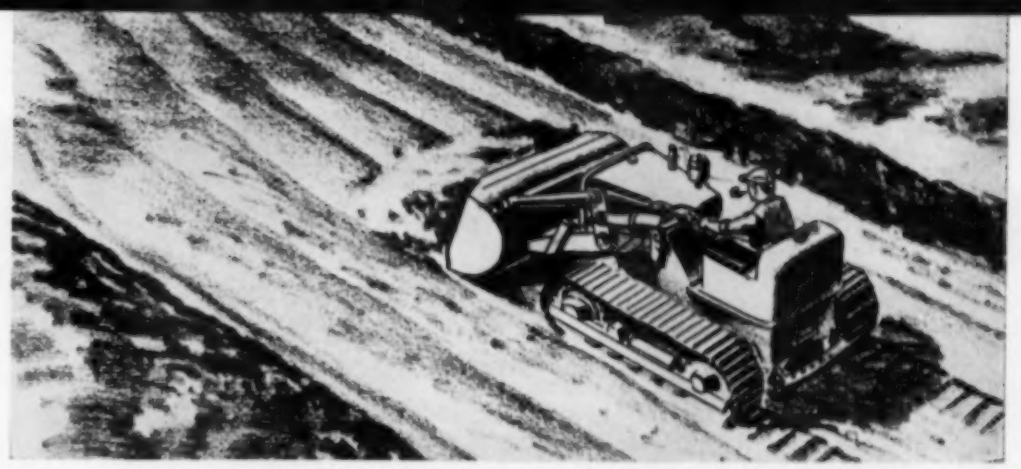
**Amarillo, Texas, has reclaimed land through sanitary landfill for a beautiful park and recreation area. Land adjacent is still being filled as shown in**

Operations of a sanitary landfill vary with the site. The trench method requires excavating a ditch which could vary from 75 to 400 ft. in length, 6 ft. in depth, and from 15 to 25 ft. in width. Excavated material is stockpiled. Incoming trucks dump into the trench. The garbage and refuse then are brought together and compacted into a cell by the tractor and shovel. Successive layers are placed and compacted until a cell has been formed consisting of the refuse dumped during one day's operation. The cell then is completed at the end of each day by placing and packing a thin cover of earth over the exposed refuse to seal it in.

The area landfill method is applicable to terrain which necessitates a different approach. In areas where there are relatively deep and unused ravines or gulleys, refuse may be dumped into these natural depressions. The refuse is then compacted by the tractor and the exposed surface covered. This operation is continued until the landfill reaches the final grade or elevation.

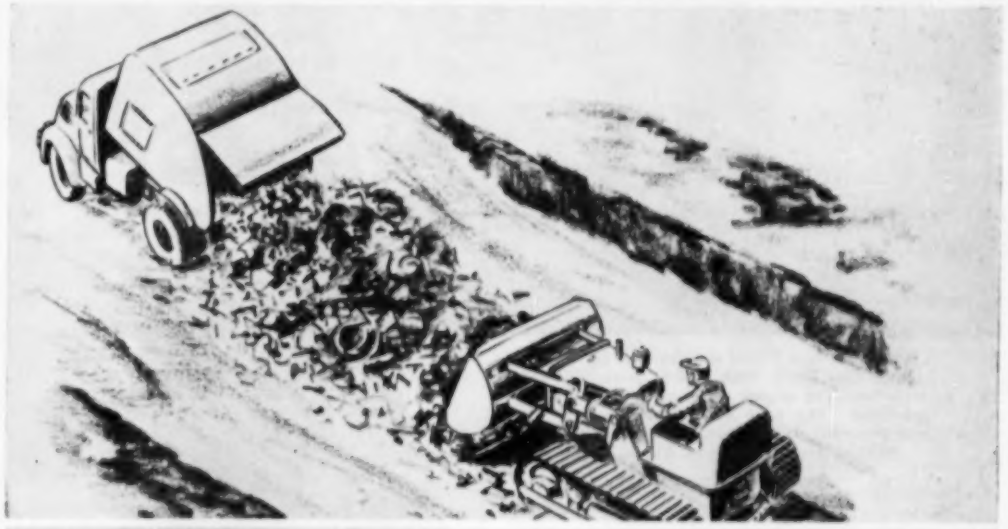
In areas where the terrain is rolling and uneven, the operation may start by using the slope of a bank which forms a natural ramp, or a ramp may be built. Material is dumped at the bottom of the slope and bulldozed and compacted against the sloped ramp in layers. At the completion of each day's filling operation, cover material is placed over the layer of compacted refuse to provide a seal against rodents or insects. By proceeding in this manner, the completed first trench will contain a number of compacted sealed cells of refuse and a second trench will be ready for filling in this continuous cut and cover process.

The sanitary landfill business can be handled in addition to contract dirt-moving. All communities that are faced with increasing population require initial or additional refuse and garbage disposal. Also towns with open dumps are definitely in the market for landfill. Civic clubs are interested in this problem and often can be of assistance in getting started.



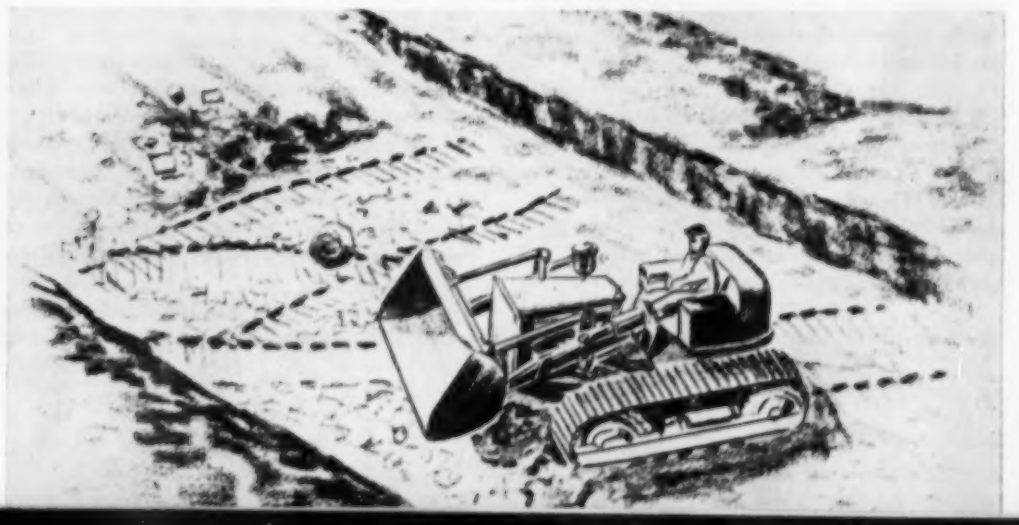
**A trench varying from 75 to 400 ft. long, 3 ft. deep, and from 15 to 25 ft. wide usually is excavated to start this method of landfilling. Excavated material is used to build a ramp along one side of the trench—down which the collection trucks can drive or back to dump their loads of rubbish.**

**Incoming trucks utilize the ramp to discharge their loads. The crawler tractor then scatters and compacts the rubbish within the trench.**

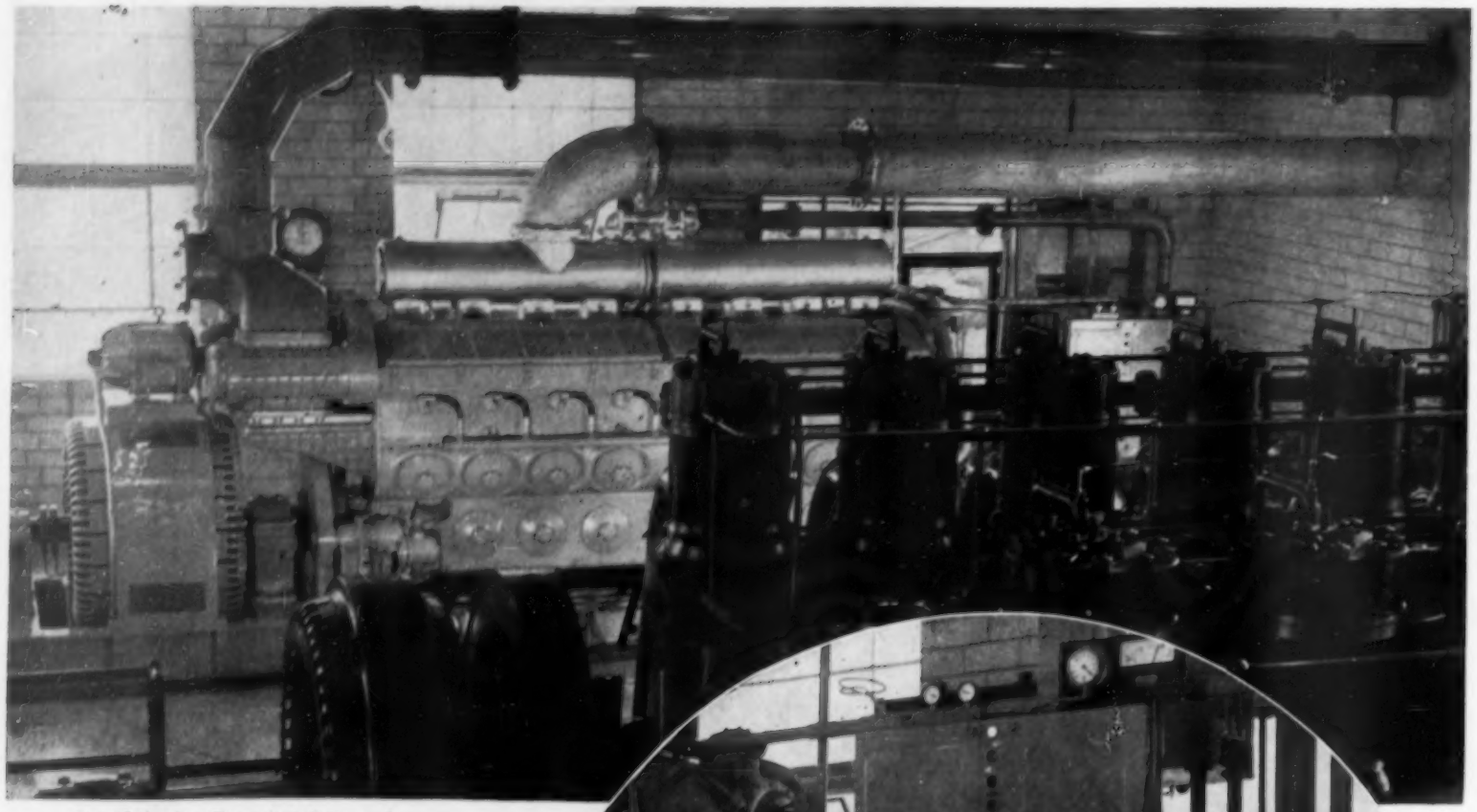


**A 2-ft. seal of dirt is spread over the refuse, with care being used to build up the cell evenly. The open end of the cell also is sealed at the end of each day with a 1-ft. wall of earth.**

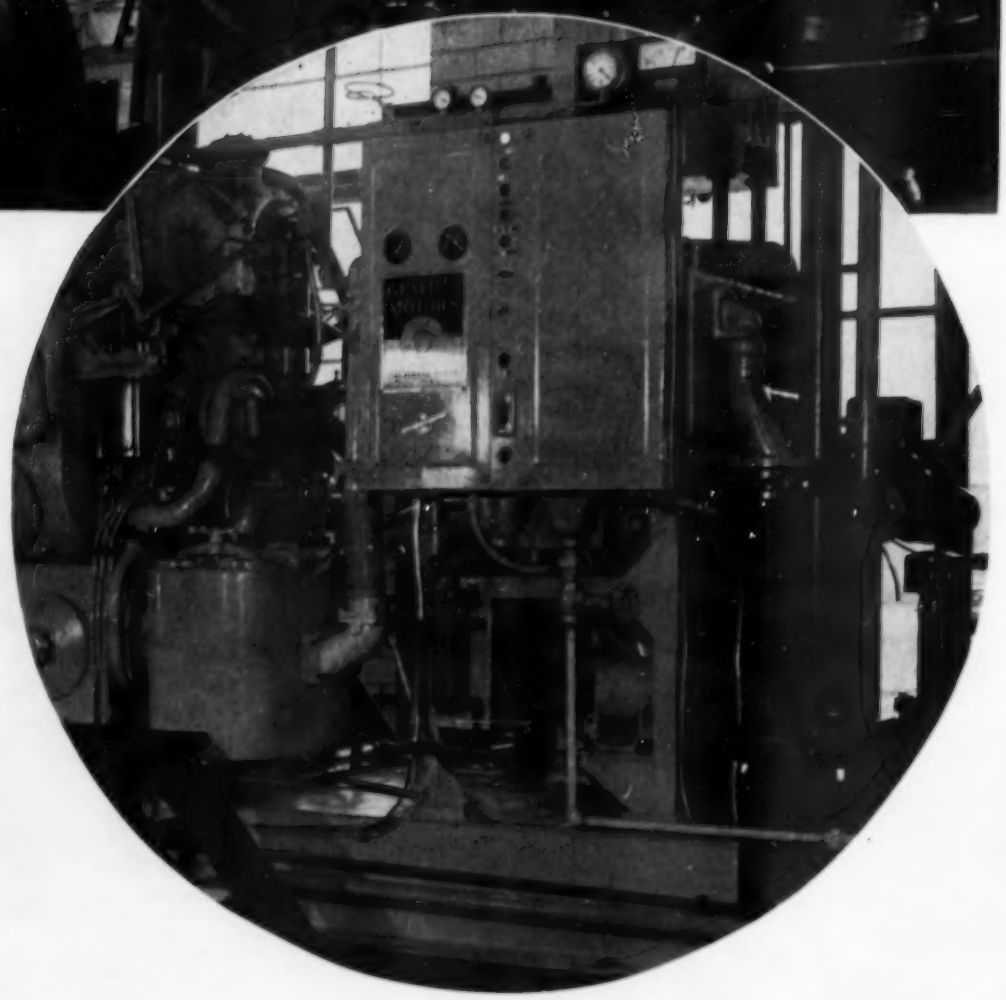
**Cover material usually is taken from a second trench, excavated adjacent and parallel to the first trench. Successive layers of refuse are placed and compacted by the tractor until a cell has been formed as shown below.**



**the background. Ravines, and other privately held but unproductive land, have been converted into tillable fields by modern landfilling methods.**



One of the first Texas installations of a dual-fuel EMD Model 567C generating sets. The engine drives an Elliott generator. The unit and installation was provided by Stewart & Stevenson Services, Inc., of Houston, Texas.



# BAIRD, TEXAS

THE City of Baird, Texas, is now operating one of the first municipal power plant installations of a dual-fuel General Motors Electro-Motive Model 567-C engine in the state of Texas. The engine drives a 1250 kva, 1000 kw, Elliott generator in the municipal light plant, producing electricity for domestic, commercial and industrial use in the city. The installation of the 1000 kw dual-fuel diesel unit has increased the capacity of the power plant from 900 to 1900 kw. The complete unit, cooling system, switchgear and installation was furnished by Stewart & Stevenson Services, Inc., of Houston, Texas.

While not too well known in municipal light and power plant circles, the Model 567-C Electro-Motive diesel engine has an outstanding record for performance and dependability in other types of service. It played an important part in dieselizing the American railroads.

The generator set at the Baird municipal power plant operates 24 hours per day, 365 days per year for an average yearly use of approximately 8000 hours of operation. The governed speed of the engine is 720 rpm, controlled by a Woodward governor. The owners report that they have had no downtime since its installation.

The Model 567-C unit is a 16 cylinder, 8½ in. x 10 in. bore and stroke, V-type engine equipped for dual-fuel operation. Records indicate that it is consuming an average of 150,000 cu. ft. of natural gas and 150 gallons of fuel oil per 24 hours. By taking advantage of the low cost of dual-fuel operation, the municipal power plant has been able to save approximately 50% on fuel costs over the cost of previous operation with other full diesel engines.

The dual-fuel diesel was installed at Baird, November 19, 1954 and has been operating continuously since. According to city officials, the unit was selected to increase the capacity of the plant and to effect a saving on fuel consumption. According to Conley L. Pruitt, Superintendent of Utilities, the engine has proved entirely satisfactory and fuel costs (combined natural gas and fuel oil) are averaging about 3.2 mils per kw/hr. The municipal power plant at Baird has been in operation since September, 1940. It has operated continuously with the exception of a three-hour period 10 years ago when there was a fire in the switchboard.

# WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **LEO WALTER**

**Leo Walter was born in Vienna, Austria, and graduated in Mechanical and Electrical Engineering from the Vienna Technical University. He served his apprenticeship in a Czechoslovakian engineering works. Later he was project engineer during construction of power and heating plants. For six years, he was Chief Engineer for Central Europe for a well-known power plant contractor. He had established himself as an independent consultant before Nazism drove him to England in 1938. During the war years, he worked for several engineering firms, but now has his own consulting office in Cheltenham. His articles have appeared in numerous engineering magazines.**

## THE UTILIZATION OF WASTE HEAT—PART I

THE utilization of waste heat from oil engines has gradually come into wider use in Great Britain since the war. Contrary to conditions in the U.S.A., where fuel economy is not as intensively practised as in Europe, industry has been exhorted during many years by authorities and by the technical departments of industrial organizations to make fuller use of heat content in exhaust gases and in cooling water. It has been pointed out that the high thermal and overall efficiency of the modern oil engine is no excuse for disregarding fuel economy. Scarcity of diesel fuel, the comparatively high price of this imported fuel, and the urgent need to save coal induced many oil engine users in Great Britain to consider waste heat recovery in order to effect better economies.

Measures taken in British industry were: improvements in engine operation by providing better training for plant operators and engineers; developments in better use of the energy produced; and utilization of waste heat. The following survey is mainly concerned with recovery of waste heat, based on actual British practice. This should be of interest to American diesel users where working conditions are favorable for achieving economies by addition of a heat exchange system to the diesel plant.

**Figure 1**

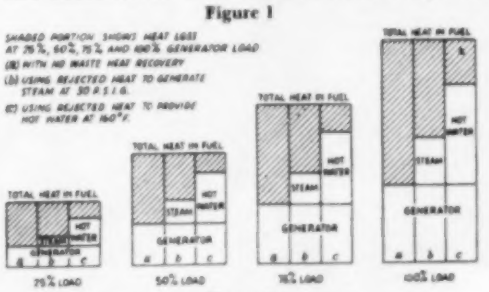
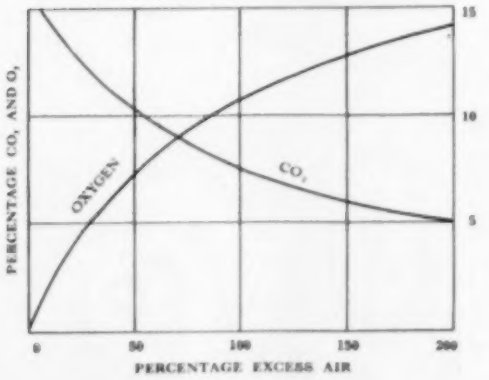

SHADED PORTION SHOWS HEAT LOST AT 75%, 50%, 75% AND 100% GENERATOR LOAD
(a) WITH NO WASTE HEAT RECOVERY
(b) USING REJECTED HEAT TO GENERATE STEAM AT 30 P.S.I.G.
(c) USING REJECTED HEAT TO PROVIDE HOT WATER AT 180°F.
TOTAL HEAT IN FUEL
HOT WATER
STEAM
GENERATOR
a b c
75% LOAD
50% LOAD
100% LOAD

**Figure 2**

OIL ENGINE EXHAUST GASES




It is well known to the progressive diesel user that something like 60% of the heat contained in the calorific value of the fuel oil input is carried away in the jacket cooling water and in the exhaust gases. As a matter of fact, each diesel plant should be considered not solely as a power plant, but as a combined power and heat generating plant. The obstacle to production of both may be that no useful purpose can be found for the recovered heat. This cuts out a number of power plants but leaves quite a few where waste heat could be used for: (a) generation of steam for process work; (b) production of hot water for process or other purposes; (c) space heating by generated hot water, steam, or warm air; and (d) for drying purposes, using either exhausted gases, diluted with air, directly or applying hot air produced in gas-to-air heat exchangers. (See Fig. 1.)

Necessary prerequisites for good waste heat recovery is that quality of the exhaust should be watched. Measurement of color, composition, temperature and smoke are not only essential for good engine operation, but also for proper utilization of exhaust heat. Observation of the color of exhaust gases is a good indication of the manner in which the fuel oil is being consumed. It is well known that colored exhaust indicates good combustion, but that any excess of black smoke indicates poor combustion due to overload, faulty pump setting, dirty or stuck atomizers, or general wear.

When planning addition of a waste heat recovery plant, from the point of view of thermal usage it is wise to begin by making one specification for all rates of heat demands, and to work out another specification for available waste heat sources, i.e., exhaust gases alone, exhaust heat plus cooling water heat, cooling water heat alone, and so on. These heat demands must then be "matched" against each other in the best way possible. In many instances, exhaust heat alone will be economical to use, but, in instances where low temperatures prevail, the use of heat in outflowing cooling water also may be useful. Of course, it would not be wise to use heat of a higher value (temperature) than necessary for a certain heat demand, where low grade heat is employed.

In general, the cost items involved in waste heat recovery can be roughly divided into four categories: (1) Amortization of the investment which may be 10%, but is influenced by several factors, such as the estimated time after which heat exchange surface, piping, ducting, and other parts exposed to corrosion have to be replaced. Then there are fluctuations in fuel prices, wages, cost of plant modernization, etc. (2) Interest on investment is influenced by rate of interest, and alteration of rate in the time to come. (3) Estimation of maintenance cost is essential, such as of regular cleaning and overhaul due to wear and tear. (4) An efficient waste heat recovery plant should work as far as possible automatically, but cost of human supervision cannot be fully avoided.

Installation of waste heat recovery equipment may mean, of course, complicating the plant. However, the attitude of some managements, who think that waste heat recovery will cause more inconvenience than it is worth, is wrong. A few actual examples, with data on savings, may prove the eminent value of such equipment. Calculations of waste

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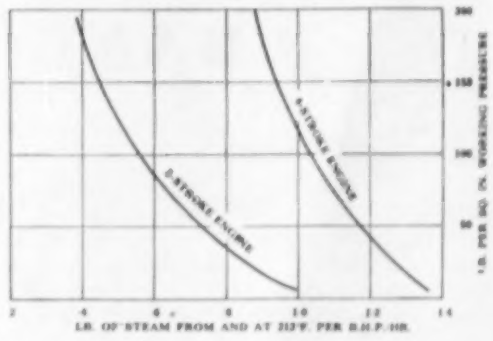
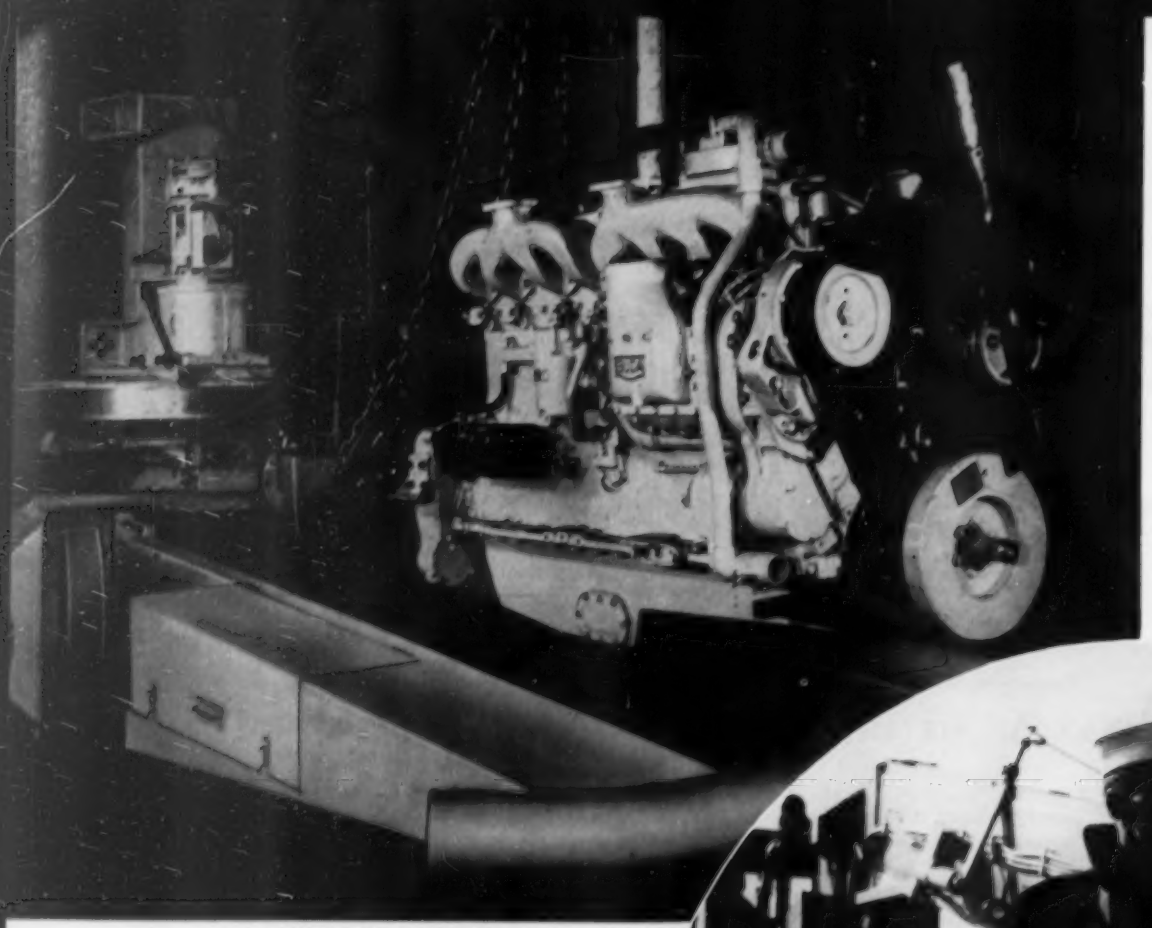
**Figure 3**





Power plant for the MB-1 consists of this Buda, 4 cycle, 325 hp @ 1800 rpm, diesel driving through a Fuller heavy duty convenional sliding gear transmission. Michle-Dexter supercharger on the engine can also be seen.

The cab of the Navy's new MB-1 mobile crane is 50 to 60 feet from the crane hook, and to assure accuracy when handling costly aircraft, precision adjustment of the hook and boom are controlled by an operator using an electric remote control box at the rear of the machine.

# HUGE DIESEL MOBILE CRANE FOR NAVY

THE Navy's new MB-1 mobile crane, able to pick up a four-engine bomber and walk away with it, made its public debut recently at a demonstration staged at Floyd Bennett Field Naval Air Station, New York. The new crane, developed under the sponsorship of the Chief of the Bureau of Aeronautics, is destined to play a vital role in aircraft handling operations at U. S. Naval Air Stations around the world. Among the most important duties to which the crane will be assigned is lifting of planes for regular periodic safety checking of hydraulic landing gear systems. In this function the MB-1 can hold the aircraft just off the ground so that mechanics can minutely study the functioning of the gear as it is raised and lowered under simulated flight conditions.

Scheduled for use in plane handling involved in servicing, repair, salvage and for other utility purposes at air stations, the crane will also serve a civilian function. In keeping with the Navy's policy of making its equipment available to civil agencies in the event of emergencies or disasters, the crane will stand ready to assist nearby police and fire departments as well as local civilian airports.

A 48-ton giant, able to travel at speeds up to 40 miles-per-hour, it features controls so precise that it can raise a weight of 80,000 pounds and lower it so gently that an egg placed on the ground beneath the load can be cracked without smashing the shell. This hairline precision control provides the extra measure of safety necessary to protect costly aircraft from damage in handling. The MB-1 crane is capable of lifting and carrying the largest type of combat aircraft currently in use by the Navy and will operate in terrain which was impossible for previous vehicles. It is powered by a Buda Model 8DAS 1125 supercharged diesel. This rugged engine, large eight-foot-tall, low-pressure tires and 40-ton lifting capacity provide versatility which allows the crane to do its job in rolling soil or sand as well as on hard surfaced runways.

Designed and built by the LeTourneau-Westinghouse Company of Peoria, Illinois, in co-operation with the Navy's Bureau of Aeronautics, the machine incorporates many devices and principles

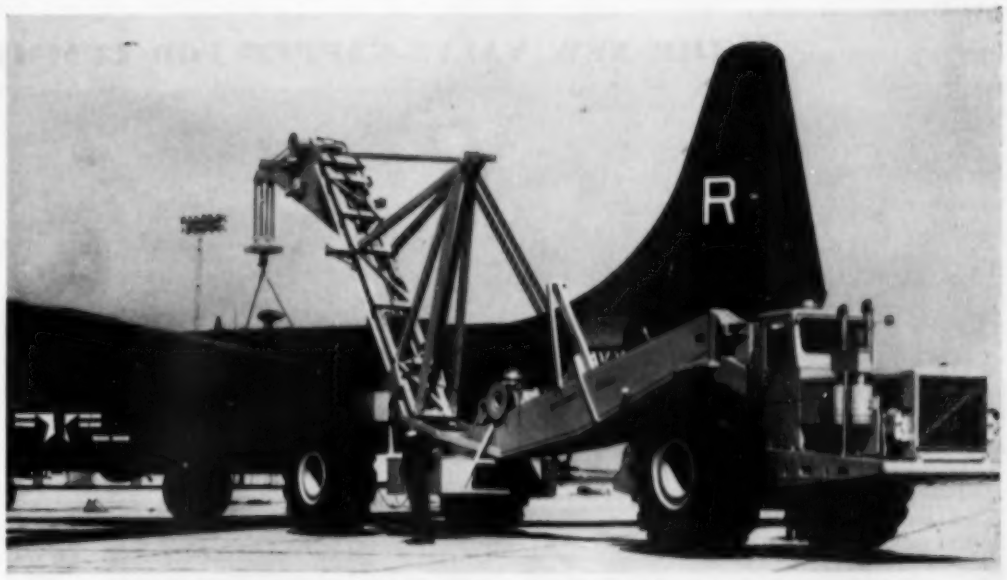
which have been proved successful on heavy earth-moving equipment built by the firm. Electricity is used extensively for the power and controls of the machine. A series of positive action electric finger-tip switches mounted on the instrument panel, control steering as well as the action of powerful electric motor and gear box units to move cables which operate the hook, boom and carriage of the crane.

Because the MB-1's great length places the operator's cab 30 to 60 feet from the crane hook, its design features an electric remote control box carried under a cover at the rear of the machine. When quick precision hoisting is called for the remote control box attached to a long cable on a spring loaded reel can be played out so operation of the crane can be directly controlled by a supervisor on the ground near the crane hook.

Safety of the unit is outstanding because all hoisting and booming operations are controlled by spring loaded brakes on the electric motors. Controls switches have normal off positions, so that should an operator become confused or excited taking his hands off the controls will instantly halt the load smoothly and automatically. This feature plus the ability to inch the load either up or down increases the confidence of the operator and allows him to operate the equipment with a maximum of speed and efficiency. The MB-1 contains a 300 volt electric generator mounted to the flywheel of the Buda diesel, which supplies the power for the electric motors that control the crane and which can also be used for nearly any function where 110-120 volt alternating current of 58-63 cycles is applicable. It can easily perform such tasks as supplying emergency power for lighting runways, work areas or hangars as well as providing electricity for hand tools and other equipment.

Mobility of the crane under load is one of its most outstanding features. Even the heaviest planes are readily lifted, hauled and placed in location without the aid of end jacks or outrigging lines. Close coupling through the use of short cables between the hook block and the boom holds swing to a minimum, increasing control and lessening the likelihood of damage to the plane as it is being transported. With its boom in an upright position the MB-1 measures more than 35 feet high, over 50 feet long and more than 13 feet wide. With boom extended it has a maximum reach of more than 30 feet. In spite of its size and weight the machine is extremely maneuverable. A 90-degree electric power steering system allows it to turn completely around in a space only 47 feet wide—less than its own length. A heavy duty, sliding gear transmission with ten forward and two reverse gears provides a wide variety of speed and power selections.

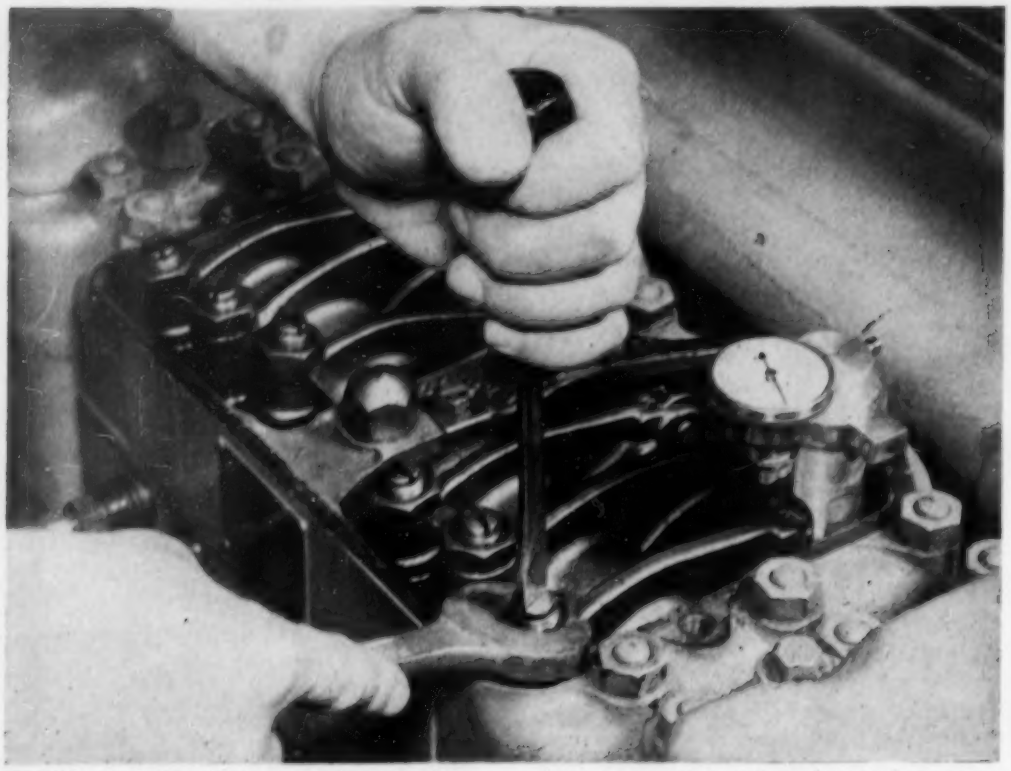
During pre-service tests held recently, the crane lifted a fully loaded jet plane and carried it at speeds exceeding 30 miles-per-hour. To control its great speed and weight, the MB-1 is equipped with large multiple-disc air brakes on each of its four wheels. Actuated by a feather touch foot pedal these brakes allow the operator to bring the huge machine to a smooth easy stop thus avoiding sway or jarring of the aircraft it is carrying. Currently in production at LeTourneau-Westinghouse, a subsidiary of Westinghouse Air Brake Company, MB-1 cranes are already being shipped to Naval Air Stations all over the globe.

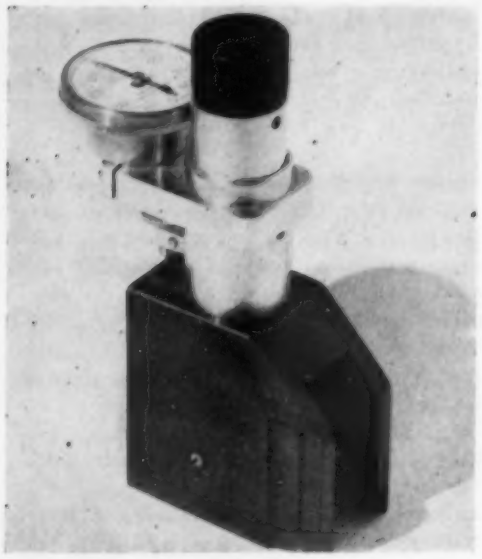


**The new MB-1 mobile crane in operation. A 325 hp Buda diesel supplies the power for this giant machine, which can pick up and walk away with the largest combat aircraft in use by the Navy.**

**Here the new MB-1, built by LeTourneau-Westinghouse for the Navy, carries a P4Y Privateer. A 48 ton vehicle, the crane can travel at speeds up to 40 mph. Its great power plus large eight-foot-tall low-pressure tires allow it to operate in the most difficult terrain.**

## THE NEW VALVE-GAPPER FOR CUMMINS ENGINES





The No. 213 P & G Valve-Gapper.

The P & G Valve-Gapper No. 212 is shown on a Series HB Cummins diesel.

THE P & G Manufacturing Co. is now making available for general distribution a "must" tool for every diesel mechanic working on Cummins H, J, NT and NH Series engines. These are the P & G Valve-Gappers No. 212 and 213.

In the January 1954 issue of DIESEL PROGRESS, we described in detail the application of the Valve-Gapper No. 201-A on GM Detroit Diesel Division diesels. The new tools come as a welcome addition to the mechanic's necessary tools for proper servicing of engines. In addition to making possible micrometer accurate settings, the new instruments leave both hands free to handle adjustment tools, thereby saving considerable time in the performance of the operation.

The No. 212 Valve-Gapper is designed for use on the H & J Series of Cummins engines and the No. 213 fits all NT and NH Series. Both tools use P & G's patented method of measuring the exact valve clearance with a dial indicator which is graduated in .001-in. This permits visual reading of the valve clearance before, during and after adjustment regardless of wear on the valve stem or rocker arm. The illustration shows the No. 212 on a Cummins HB engine and demonstrates the ease of making the necessary adjustment. Simplicity of handling will make the Valve-Gapper an important item in every servicing shop.

The Valve-Gapper for the GM engines, in addition to making the valve adjustment a simple operation is also designed for timing fuel injectors and balancing fuel racks. Valve-Gappers are available through automotive jobbers. Additional information is available from P & G Manufacturing Co., 305 N.E. Russell St., Portland 12, Ore. (ITS NEW)

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## GIANT CRAWLER TRACTOR

Greater power, durability, operating ease and comfort and a smart new appearance are outstanding features of the increased horsepower International TD-18A diesel crawler tractor, now in production by International Harvester Company. Power in the new model has been increased to 103 drawbar horsepower—a boost that enables it to handle rougher, tougher jobs. The drawbar pull is 24,300 pounds at rated governor speed of 1450 rpm. The new, heavier power train gearing is designed for trouble-free transmission of the increased horsepower from clutch to tracks. The TD-18A has six forward and two reverse transmission speeds, ranging from 1.6 up to 5.5 miles per hour—designed to give a correct speed for every job and assure full horsepower utilization at all times.

Productivity has been still further increased by strengthening track frames, rearranging control levers compactly and conveniently, providing positive-locking, tiptoe-action brakes, and giving the operator greater comfort so he can do a better job without tiring.

Track frames on the new model have been made

300 per cent stronger, according to I-H, with machined surfaces to assure permanent fit and positive, permanent track alignment. The track frames have machined surfaces at the points where track frame pivot brackets, front idler support assemblies, track spring retainers and equalizer spring guides are attached. Diagonal braces are all line reamed and doweled to assure tight, permanent fit.

The new box section track frames beef up the three-point track suspension system. Track frames are kept from tilting by heavy steel arms that connect the frames with the pivot shaft by special bearings. The track frames are mounted at the ends of the pivot shaft by ball-and-socket joints, designed to eliminate leverage loads from the pivot shaft. The front stabilizer keeps track in proper lengthwise alignment and virtually eliminates leverage loads from the track frames. Maximum track-to-ground contact on grades or rough terrain is obtained through individual track oscillation. The box sections are made up of four continuously welded individual members, for greater strength and permanent alignment.

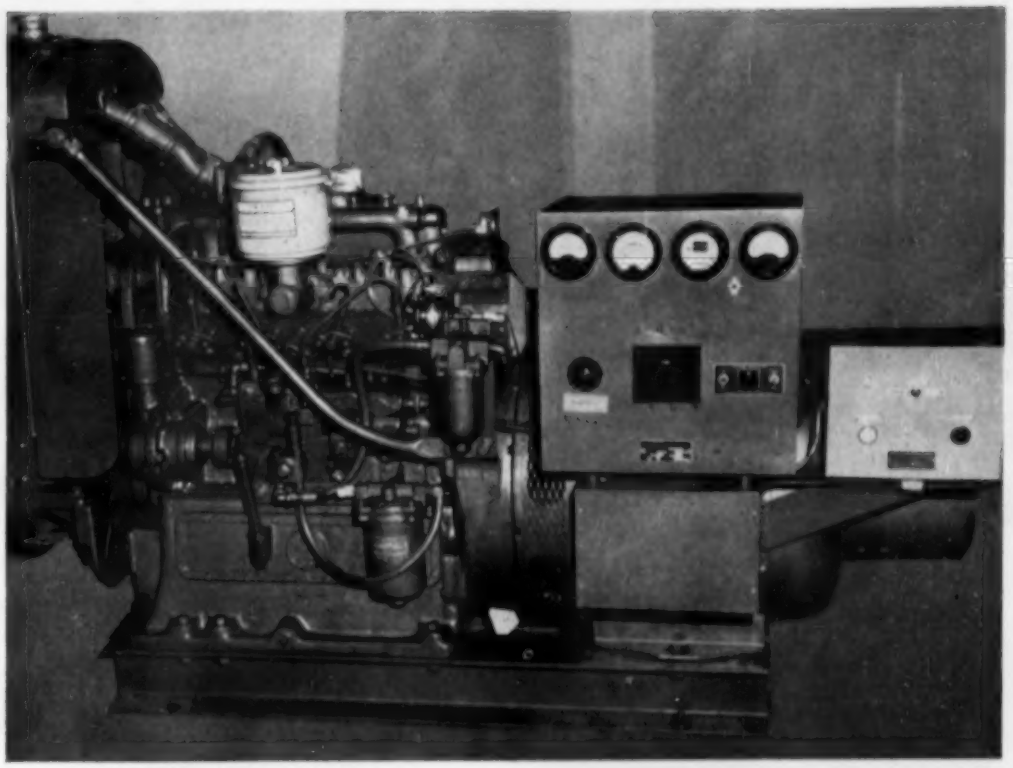
The TD-18A is the second most powerful crawler on the International team. It has adopted the radiator grille style of its big brother, the TD-24. The TD-18A has a four-cycle diesel, valve-in-head, six-cylinder engine. There is a 12-volt electric starting and lighting system, including starting motor, generator, batteries, two headlights and one rear light. It offers all-weather starting, with a built-in gasoline conversion system. The tractor is 158¼ inches long and 96 inches wide with 22-inch shoes. It comes with regular or extended track frame. Operating weight with the former is 24,585 pounds, with the latter, 25,605 pounds. (ITS NEW)

# OREGON HOSPITAL USES DIESEL

*By* CHAS. F. A. MANN

CARING for the hospital needs of the busy lumber, paper, and fishing port of Coos Bay, on the beautiful coast of southwestern Oregon, the Keizer Memorial Hospital has joined the growing list of medical centers that have installed emergency diesel generating sets to protect essential lighting and surgery against normal power failures. Located in North Bend, one of the trio of cities surrounding the harbor, the hospital handles many accident cases arising from the heavy logging activity nearby and from the traffic on U.S. 101.

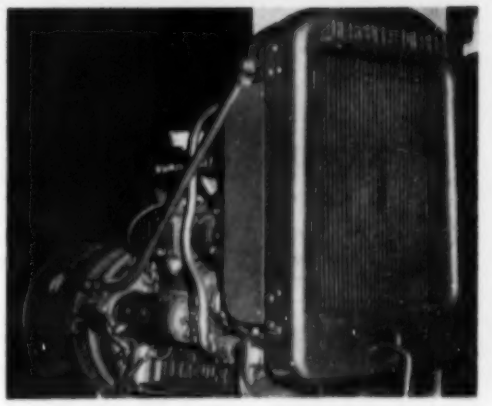
The emergency power unit is an integrated Kato-Hercules 20-kw set, assembled and sold through Star Machinery Co., Seattle, and installed by Hansen Electric Co., Coos Bay. The Hercules diesel is a 4-cylinder, 4-cycle engine rated at 30 hp. The generator turns at 1200 rpm and is rated 20 kw, 25 kva, 3-phase, 120-208 volts. The exciter is mounted on a shaft extension. It and the instrument panel were designed by Kato Engineering.



**The Kato-Hercules diesel generator in the Keizer Memorial Hospital.**

The engine has an Air-Maze air filter, Purolator oil filters, American Bosch fuel injection, and the integrated unit is mounted on a steel platform, supported by Korfund vibration dampeners. Vibration and sound is further reduced by fitting a Rexwell Flexible metal exhaust bellows between the engine and the pipe leading to the Kittell residential-type muffler. Load control on the diesel is handled by a Pierce close-regulating governor.

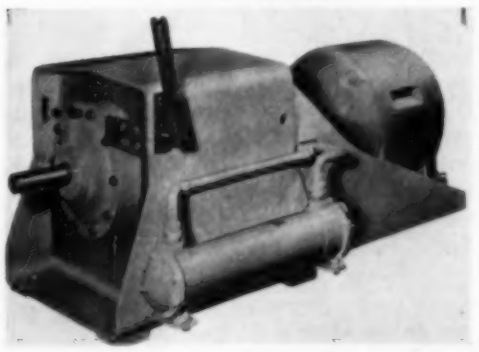
The elaborate, yet compact, electrical control system features a 100-amp Asco line transfer switch, together with Custom Built Control panel. This set-up provides instant, automatic, timed-cycle engine cranking and 6-second start-up in case primary power fails. The Custom Built unit also has water temperature and low oil pressure alarms and shut-downs. Both the Custom Built control panel and the Katolite main electric board are bracket-mounted on the side of the main and excitation generators. The Delco starting system is supplied by a set of Exide batteries. To keep these at full charge, an Electric Service Co. trickle charger unit is employed.



## GYROL FLUID DRIVE

A new line of enclosed, completely self-contained fluid drives featuring stepless speed control, no-load starting and excellent torque limiting control for smooth transmission of power in power plants, refineries, steel mills and a wide variety of other general industrial applications is now available from American Blower Corporation, Detroit 32, Michigan. Designated the Type VS Class 2 Gyrol fluid drive, the new units are available for a wide range of speed adjustments on both variable and constant torque loads. The units are designed for dual rotation, thus the Class 2 fluid drive and load can be reversed while in motion by merely reversing input rotation when used with a motor.

**The Type VS Class 2 Gyrol fluid drive unit designed for industrial applications.**



The new Gyrol fluid drive permits the motor to come up to speed under practically no-load conditions. This allows simplification of motors and starting equipment for heavy starting loads. Across-the-line starting is practical in many cases. The new fluid drive units will limit the amount of overload torque which can be transmitted to the load. Torque transmitting capacity is adjusted by positioning the speed control lever. Rate of movement of the same lever governs acceleration rate.

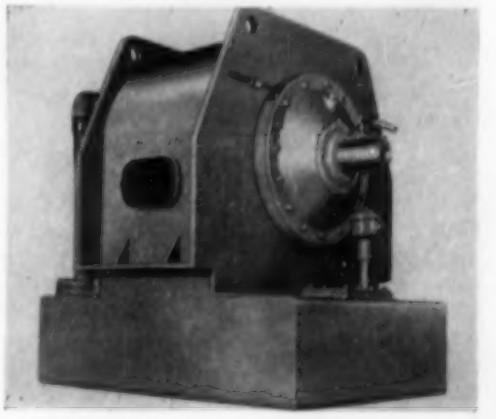
Another model of the Gyrol fluid drive is now available in an enclosed, self-contained, packaged unit, manufactured specifically for oil field application. These units are designed for compounding multiple drive engines on large drilling rigs, and can be used effectively with any compound design.

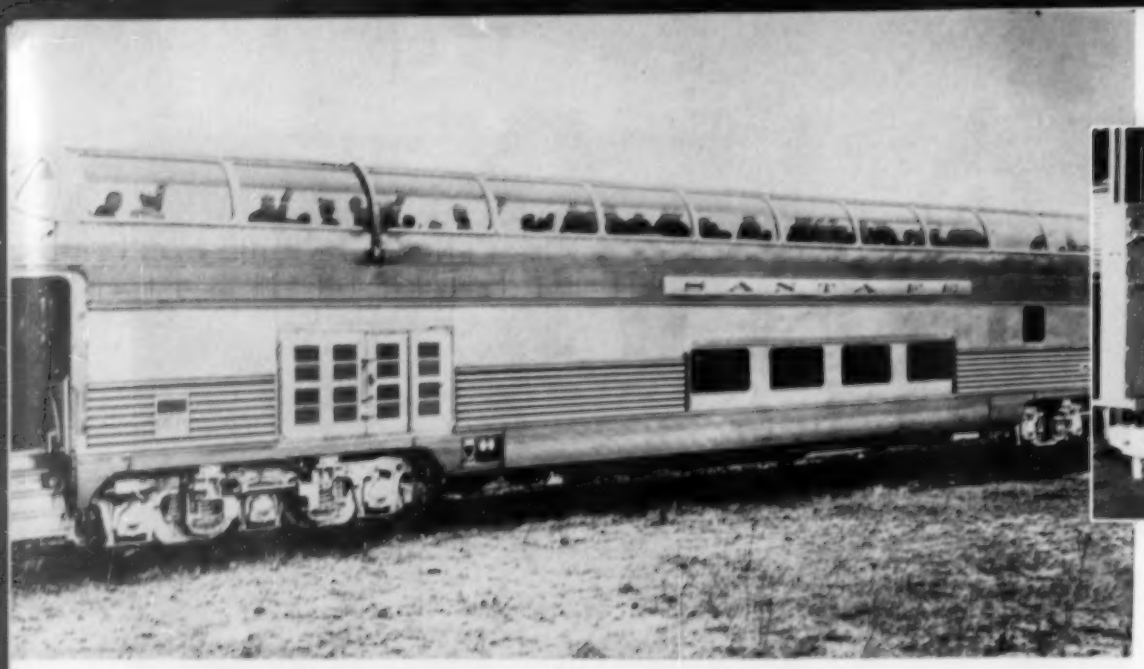
They are ruggedly built to meet service requirements of rotary, slush pump and draw works.

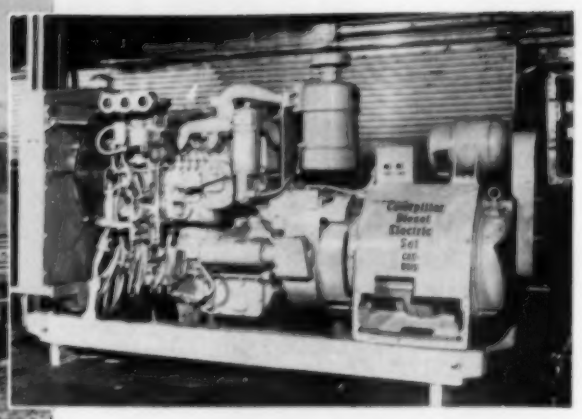
Designated Type VS Class 2F, the new Gyrol drives are available in a design which permits infinite adjustment of speed and torque over a wide range. They are built to fit standard 18 inch channel oil field skids. The cushioning ability of this fluid drive is a valuable aid in compounding engines and provides flexibility in manipulating pumps.

(ITS NEW)

**The Type VS Class 2F model designed for oil field applications.**







The Cat D315 electric set is shown outside of the dome car before installation for Santa Fe. Filters and serviceable components are installed on one side for ease of maintenance.

# DIESELS ASSURE COMFORT IN DOME CARS

WHEN the Santa Fe Railroad asked The Budd Company to build 14 full-length dome cars, a special problem loomed for Budd engineers. How were the passengers going to be kept comfortable "under glass" while being sped through such extremely varied temperatures, humidities and altitudes as are encountered in crossing deserts and mountains on the West Coast runs?

Engineers decided the right answer was to use 60-cycle *alternating* current to power the 20 tons of Trane air conditioning equipment in each car for the purpose of maintaining normal conditions regardless of extreme changes in outside ambient temperatures. The use of ac power to this extent on American railroads was a somewhat new idea. To supply this auxiliary power, Budd engineers chose a Caterpillar D315 self-regulated electric set —to be installed in each car. Powered by a Cat diesel, the 220 volt, 60-cycle ac generator develops 40 kw. This is ample power for the air conditioning equipment, plus the lighting system and other electrically-operated conveniences in the car. The use of high-voltage, ac power assured compactness because smaller, lighter electrical cables and conduits could be used. Also, the size and weight of compressor, evaporator and condenser motors to power the two 10-ton Trane air conditioning units could be much smaller. The weight and space needed for batteries when using an axle-driven dc generator was reduced by more than 80%. Each car thus has an independent electrical unit, regardless of whether or not the car is in motion.

The electric sets, being mainly self-regulated, completely eliminate many electrical maintenance features. No rheostat, voltage regulator or similar regulating devices are needed because the design and construction of the generator are such that the voltage variations between no load and full load is well within the limits suitable for operation of the electrical equipment contained in the cars.

The generator set is placed in its own engine room on the main deck at the forward end of the car. A similar room houses the Trane air conditioning equipment at the other end of the car. Space in both rooms is ample for easy maintenance from within the car, even when the car is in motion. The two compressors on the Trane unit are driven by 15 hp, 220 volt, 3-phase motors with time delay starting devices to prevent excessive starting load on the generator. There is also a 20-ton full-flooded condenser constructed with two 10-ton coils, a single motor-driven fan and separate motor-driven pumps and sprays for each coil. Two 8-ton evaporators are equipped with heating coils and the evaporator coils are split in 4-ton sections, two of these sections being a part of a 10-ton compressor system. Each of the two evaporators delivers air to its half of the upper deck through a special three-way duct. This duct is open on a seasonal basis and, during the heating season, the two side ducts are blocked. During the cooling season, the entire air distribution system in the dome is controlled by a Solar Thermostat, located outside the car, which reduces fan speeds and delivers less total volume of air during cloudy days. This system does not affect the lower deck to which air is delivered by a four-ton evaporator.

In the dome section, the Anemostat air outlets are located in a panel in the ceiling of the dome. Each side of this panel contains a slit through which the cooled air is forced toward the top section of the curved glass.The air follows the curvature of the glass and provides a curtain of air between the passenger and the window. This ingenious device minimizes the heat which would be transferred through the large areas of glass. This heavy sun load was the main problem encountered by the car designers. The bar on the lower deck features mechanical refrigeration; and an electrically operated dumb-waiter handily serves the dome section. A public address system over which music and announcements are made also is located at the bar. The diesel electric set base rests on tracks which allow the unit to be rolled through doors to the exterior of the car and onto a special table which is supported by two steel cables. This makes yard and shop maintenance easy. However, to further simplify maintenance while the train is in motion, all serviceable components such as filters have been mounted on one side of the unit. If, however, the opposite side needs attention, the set can be rolled to the outside wall of the engine room without difficulty.

Ten thousand cubic feet of air per minute is circulated through the engine room. The air is drawn in through filters in the louvered doors, pushed with the radiator fan to an air discharge plenum where it is discharged through a grill in the floor. A large capacity radiator was installed on the D315 to handle the 120 degree ambient temperature expected to be encountered in the western deserts.

During winter months, a steam heating system maintains a constant 50 degree temperature in the engine room. The entire unit is suported on Lord rubber dampers which isolate any vibration that might occur. The engine room walls are of perforated paneling, backed with fiber glass insulation, which eliminates sound from passenger spaces.

The 200-gal. fuel tank is located beneath, and towards the center of the car, some 35 ft. from the engine. It contains more than double the amount of fuel needed for a full run to the Coast. The exhaust stack is located outside the car and is concealed behind one of the ribs separating the glass in the dome. The diesel may be started from two locations—at the engine itself or from the switch locker at the end of the adjacent passageway. A switch marked "Safety Switch" is located above the engine for the purpose of locking out the remote start button while working on the unit.

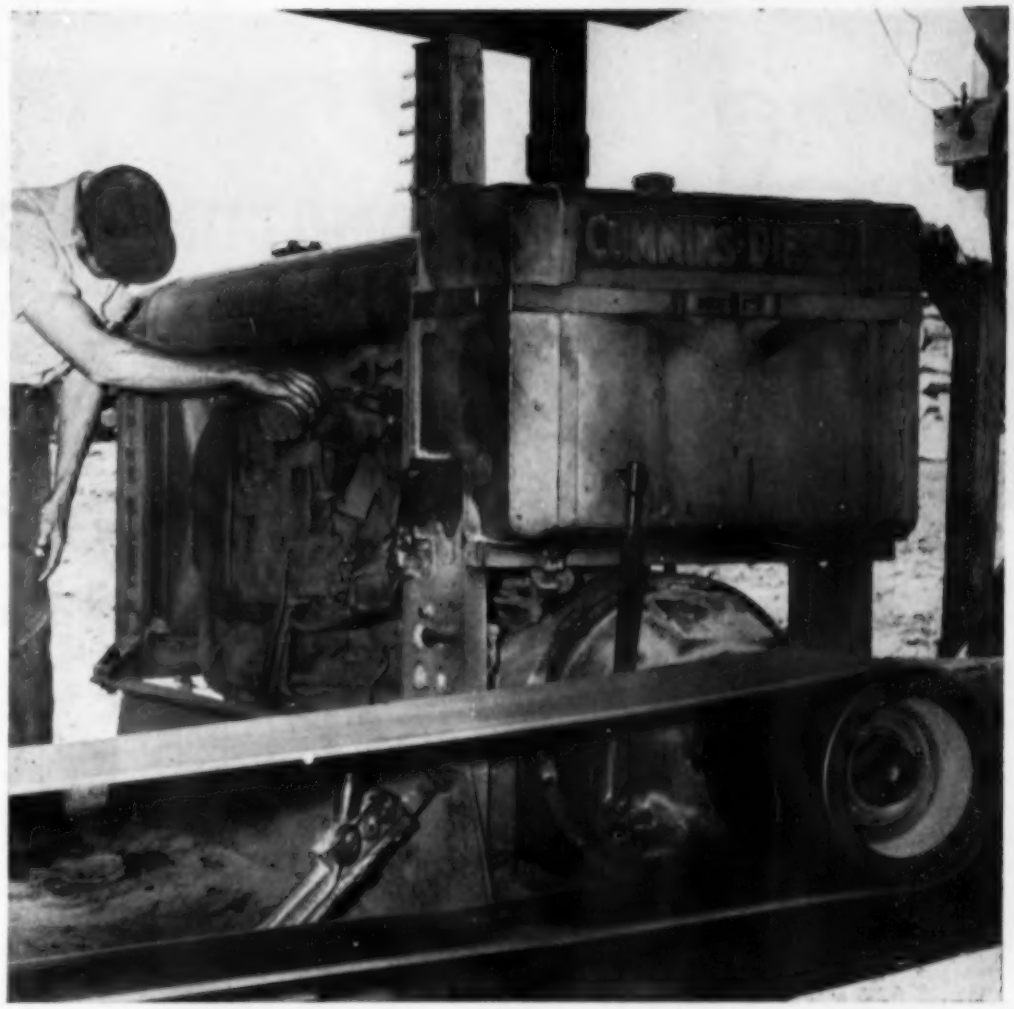
# DIESEL DRIVES BARREL HEADER MILL

*By* H. L. HOUCK

IN the case of a barrel there is no question that two heads are better than one. When it comes to power to cut the white oak for these heads, J. H. Hunter, of California, Mo., thinks there is no question but that a diesel is the answer. Three years ago he replaced a gasoline engine in his high-production barrel header plant with a 150 hp Model H Cummins diesel. It drives the 60-in. header saw and other saws. Before he decided on a diesel, he checked the cost of repowering with a larger gasoline engine and of replacing the prime mover with individual electric motors. After three years' experience, he is glad that he selected the diesel because of its reserve power and inherent economy.

"No other power could have given us such good results," Mr. Hunter said. "Gasoline engines do not provide sufficient economy. Demand rates for a minimum of 150 hp for electric power eliminate electricity from consideration. We got reliability and stamina in our diesel plus a reserve surge of energy that kicks the big 5-ft. circle saw through tough white oak knots. In three years our daily cost for 8 hours continuous operation has not been over $6 and our total expense has been a quart of No. 10 oil in the governor. We've had no repairs or down time," Mr. Hunter said.

Manufacturing white oak heads is an exacting business. White oak trees are bought from farmers. The trunk is cut into two-foot lengths, split two to four ways into "bolts", and trucked to the mill. These bolts are about the hardest wood known to man. After two weeks on the lot they acquire more toughness. The big saws are sharpened not less than six times daily and are gummed once daily with a power grinder.




A 150-hp Cummins diesel was chosen over gasoline and electric power when a new prime mover was purchased for this mill. It drives through a Twin Disc clutch. Daily costs for 8-hour operation are less than $6.

In addition to the main saw and the edgers, there is another important saw in the mill. Called the equalizer, it is a 36-in. rip saw, driven by four V-belts from the jack shaft. It is used to square up the bolts before they go to the 60-in. saw. It takes 50 hp to pull the equalizer. The jack shaft is driven, through a Twin Disc clutch, by a flat belt. The engine is governed at 1700 rpm. The governor must be sensitive enough to pick up the load from idle to full load instantly. For example, when the sawyer is slicing the heads off a bolt in the unique swinging cradle, the loader may be cutting through a bolt while the equalizer and both edger saws are being used as fast as the men can push the heads through. This adds up to a jerky load that would drive anything but a highly sensitive governor crazy. There is also a wide variation in the power needed to slice some bolts—some are just naturally harder than others with twisted tough grain and others have knots.

The highest grade of sawed stock is called "bourbon," taking its name from the use of the barrels for bourbon whisky. First grade barrels, however, are used for other purposes. The second grade is called the "oil grade" from the fact that it once was used for containing oil. Most oil now goes into steel drums and the oil grade therefore is used for vinegar, kraut, pickles and other commodities.

Mills in the white oak territory which extends through several states, ship heads and staves all over the country. Mr. Hunter has shipped several carloads to Canada, for example, and now has the capacity of his mill sold for the balance of 1955. In this circumstance, the reliability of the prime mover is of utmost importance. Downtime lost on such a contract would be money down the drain that could never be recovered.

J. H. Hunter (right), owner of the barrel header mill, discusses production costs with his superintendent, Ray Johnson. White oak stave and head materials are in such demand that the mills' production is contracted for the year.

# AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

**Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.**

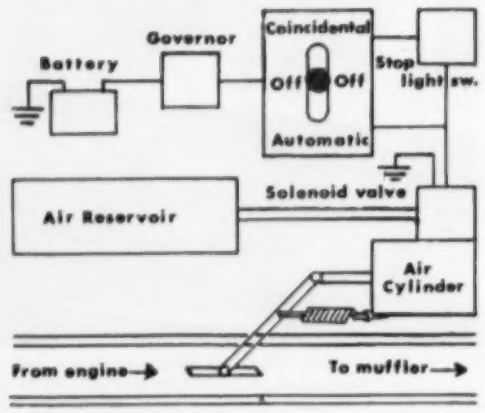
## THE EXHAUST RETARDER

AUGMENTING the retardation afforded by engine compression, the so-called exhaust brake was referred to briefly on this page in the June, 1955 issue. Actually the device is not a brake at all, in the ordinary sense, since it is incapable of bringing the vehicle to a stop. It more properly should be classed as a retarder for the purpose of assisting the brakes in reducing speed or holding back on downgrades. Originated many years ago, the exhaust retarder was ignored until comparatively recently when it began to reappear in Europe and only recently has it been adopted in America. One reason for this delay is to be found in the fact that it is better adapted to diesel than to gasoline engine application.

With the rise in popularity of diesel engines in automotive vehicles, it is natural that the advantages in this respect which they enjoy should be exploited. Essentially, the exhaust brake comprises a simple butterfly valve in the exhaust pipe, between the exhaust manifold and the muffler and preferably directly adjacent to the former. When closed, this valve impedes the escape of the exhaust and so builds up back-pressure. This results in the conversion of a part of the kinetic energy of momentum into heat, most of which is absorbed by the cooling system and dissipated to the atmosphere.

As in the case of the unassisted engine itself, the retarding effect is greatest at highest engine rpm and diminishes with a decrease in speed. This is exactly the opposite of the effect of speed on the effectiveness of the friction brakes. These are least effective at highest speed and attain the greatest effect just before the wheels stop turning. How much the exhaust brake contributes depends upon the characteristics of the engine, its displacement and the total gear reduction between the crankshaft and the rear wheels. Those diesels in which the fuel delivery is completely cut off when drifting or coasting receive the most benefit, while those which, by reason of the use of unit injectors must maintain a minimum of idling injection at all times receive slightly less effect.

The exhaust brake has not been found practicable on gasoline power plants. It is impracticable to shut off the ignition every time the vehicle decelerates, and, since all of its breathing is through the carburetor, it must continue to burn fuel when drifting or coasting. Also, the vacuum in the intake manifold at such times greatly reduces volumetric efficiency of the engine and therefore the volume of air to be compressed. Most serious of all, the continued firing against back-pressure is prone to raise the temperature of the exhaust valves to an extent that is destructive.




Happily, the diesel, with complete fuel cut-off, is free of all these handicaps and all diesels have the advantage arising from the fact that having no throttle, a full charge of air is drawn in on each cycle, so that compression pressure is always at its maximum for the speed at which the engine is turning. Those engines without means of cutting off fuel delivery completely in drifting or coasting receive slightly less benefit from the exhaust brake; but since the amount of fuel injected at such times is quite small, the effect upon exhaust valve temperature is inconsequential. Because it is subjected to the full heat of the exhaust when open and the engine pulling, the butterfly valve is best made of heat-resistant material, such as nichrome. Here also, the diesel enjoys an advantage, since exhaust temperatures are appreciably lower than those of gasoline engines.

Various schemes have been tried for the control of the exhaust brake, from a simple pull-wire to some elaborate electro-pneumatic systems, such as illustrated schematically on this page. While there is nothing that an automatic control can accomplish that intelligent manual operation cannot duplicate, they are favored for the sake of the protection they afford against careless or unskilled handling. Were the butterfly valve to be closed while the engine is pulling, even under very light load, severe damage would be wrought on the valves, pistons and rings and possibly other vital parts and the butterfly valve itself would suffer damage.

Retardation by any means serves two separate purposes: 1. To hold back in descending long grades; and, 2. To assist the brakes in slowing down for stops. In the first of these, the retarder may be brought into play without recourse to the brakes, save occasionally on sharp pitches or critical curves. In the latter, it may come into action only when the brakes are applied. In no case should the exhaust brake act except upon full shut-off, or at least minimum delivery of fuel.

In the control system illustrated, the butterfly valve, held open normally by a spring, is closed by a small air cylinder when air is admitted by a solenoid valve. On the instrument board is a three-way switch. Its three positions are: Upward—Coincidental with brake application. Middle—Off. Exhaust brake inactive. Downward – Automatic. Butterfly valve closes whenever injection pump rack moves to no-delivery position. In the automatic phase, the circuit to the solenoid valve is closed by a simple limit switch, actuated by the governor. This is the control position that would be used for long descents. Whenever the driver releases the accelerator fully, the butterfly valve closes. On reaching a level stretch or one of those short "up pitches" which occur on long downgrades, the instant the accelerator is depressed, the butterfly valve springs open. In the automatic position, the exhaust brake also acts as a clutch brake to decelerate the engine rapidly when shifting upward.

When set for coincidental operation, the exhaust brake remains out of action regardless of the accelerator, responding only when the friction brakes are applied. It therefore does not interfere with the

free drifting of the truck in rolling country; but assists the brakes when they are applied with the accelerator released. In this position, the circuit not only runs through the governor, as in the Automatic position, but also through the stop-light switch.

An interesting feature of this system is the fact that the butterfly valve cannot close while the engine is pulling or idling, regardless of the position of the control switch. Should the driver forget to move it from the Automatic position when shutting down the engine, there would be a small continuous drain on the battery. In either the Off or Coincidental positions, however, the circuit would remain open in such circumstances.

Effectiveness of the exhaust brake on naturally-aspirated diesels with full fuel cut-off when drifting or coasting amounts to approximately 50% increase in engine drag. In terms of coasting, this might be visualized as the ability to hold back successfully in the next faster gear in the transmission. In stopping it should augment brake effectiveness about 20%, while having a favorable influence on brake fade and brake wear well above this figure. One additional benefit which the exhaust brake confers during long descents is that of helping to maintain engine temperature at a time when normally the tendency is to over-cool. Practically all of the heat generated by the air compression goes into the coolant and thus aids in sustaining desirable operating temperature.

### Extra "Crop" for Kansas Farmer

When Frank J. Pecka purchased a farm near Burlington, Kansas in 1922 he had no idea that one of his "crops" would be agricultural limestone. However, he soon found that a large layer of rock under his land was of high calcium content and decided to go into the rock crushing business. This business he carries on today in addition to his farming activities. As rock crushing is ordinarily an industry far removed from farming, Mr. Pecka started his new venture on a small scale. Today, he has a rock crushing business producing up to 150 tons of powdered limestone per day.

Equipment used includes an Allis-Chalmers tractor-bulldozer which helps uncover the stone, a Sullivan air compressor and drill for drilling holes for blasting, a Unit shovel for loading, also crushing and pulverizing plants for processing the rock. All equipment is powered by General Motors two-cycle diesel engines in sizes commonly used on farm machinery.

### Visits Enterprise Plant

Cliff Younie, left, superintendent of the Manilla, Iowa municipal generating plant, and Mike Conway, advertising manager of Enterprise Engine & Machinery Co., San Francisco, discuss a new DGSG-38 engine with Elliott turbocharger undergoing test in the Enterprise plant. This is the second Enterprise engine for the Manila plant. It is an 8-cylinder, turbocharged, dual fuel unit. Mr. Younie said the Manilla plant started operating in January, 1915, and is the oldest diesel generating plant in the state of Iowa. It has four engines.

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*AP 174-715*

International scrapers and 'dozer hard at work preparing the right of way for a new Florida highway.

A dieselized cane loader working in the fields of the U. S. Sugar Corporation. The loader is powered by a GM 4-71 engine. The cane carriers to the left are pulled to the refinery by a diesel crawler.

An International UD-16 provides dependable unattended 24-hour service driving a pump which removes 30,000 gallons of water per minute from low land near Hobe Sound Florida.

Resembling a large rubber-tired flat-car, this giant R. G .LeTourneau "Tree Crasher" is clearing land near the Georgia-Florida border. Two diesels provide motive power.

# DIESELS HELP DEVELOP FLORIDA

*By* SIDNEY HOFFMAN

FLORIDA has become a gigantic diesel laboratory. In the face of a booming population and industrial expansion, both the state and federal government and individual contractors have met and are still meeting problems which are unique to that state.

Those problems have taxed the ingenuity of the men involved but they have almost without fail come up with a solution, however unorthodox the solutions may appear. In effect, their success has in a good measure been a tribute to the stamina and dependability of diesel engines. Low lying land which is subject to flooding, swampy country, heavy jungle-like vegetation and the fact that a portion of the state lies in the hurricane belt would have been discouraging factors only a few years ago. Today they are prepared for and met almost as a matter of routine.

Whether the engine is a one-cylinder unit on a generator providing power out on the Keys, a crawler tractor clearing underbrush, a pumping unit on flooded farmland or a large stationary generating plant . . . it has made modern living possible where it would otherwise be unknown. Power is the key to modern living, dependable power in a small package which can be quickly applied or quickly moved to where it is needed. Only diesel provides the answer.

The most spectacular diesel undertaking in Florida is the giant flood control program taking place to control the waters of Lake Okeechobee. Among the pumping stations in this project is one of the world's largest. It houses six 1600-hp Fairbanks-Morse opposed-piston diesels which drive pumps capable of moving more than 3 billion gallons of water per day. With the operation of this flood control plan, Florida for the first time in its history sees the prospect of draining the Everglade swamps and converting them to useful cultivation.

In rural and in metropolitan areas, the influence of diesel on Florida's economy will continue to grow. Because of Florida's topography, climate and special problems, diesel applications will continue to be unusual, and especially adapted to its particular needs. An excellent example is the Tree Crasher "jungle destroyer," built by R. G. LeTourneau, of Longview, Texas for a Pahokee contractor for land clearing work. Tires measure 10 feet in diameter and 5 feet wide. It packs the wallop of an M-24 tank. Yet its degree of flotation is so great it can roll over a pocket watch without smashing it. The vehicle's flat top is capable of supporting more than 200,000 pounds. The unit is diesel-electric powered with two diesels near the center and driving motors in each of the wheels.

## GM Increases Training Facilities

**A. F. Brecht, Detroit Diesel's service manager, presents the keys for the new overseas training unit to F. A. Von Schon, service manager of General Motors Overseas Operations in Detroit. In the picture from left to right are Edmund Burke, Jr., of Caracas, Mr. Von Schon, Mr. Brecht, A. T. Baynes, manager special sales activities at Detroit Diesel and R. L. Burpee, Detroit Diesel's merchandising manager.**

Another step toward making on-the-job training in the proper operation and servicing of General Motors diesel engines available throughout the world was taken recently when the Detroit Service Department of General Motors Overseas Operations took delivery on a mobile training unit for its branch in Caracas, Venezuela. Equipment for the school is carried on a 12-ton dieselized truck and includes live engines, cutaways, assemblies of component parts and factory approved tools. The courses offered provide actual experience up to complete overhauls with visual aids, charts and lectures supplementing the actual servicing operation. The unit is fully equipped for courses on Detroit Diesel's "71," "6-110" and "51" series of engines.

In presentation ceremonies held at the factory in Detroit Mr. Von Schon, service manager for GM Overseas, received the keys for the new unit from A. F. Brecht, Detroit Diesel's service manager. Also in attendance were Edmund Burke, Jr., of General Motors Interamerica Corporation of Caracas, under whose supervision the unit will operate, and other GM officials from Detroit and New York.

## The International UD-525

**The I-H model UD-525 diesel: a six cylinder power unit developing 115 hp at 1800 rpm.**

A new booklet describing the International UD-525 diesel power unit has just been published by International Harvester Company. This power unit develops 115 horsepower at 1800 rpm. Without radiator, fan or clutch—the UD-525 develops 121 horsepower at 1800 rpm. This six-cylinder, four-cycle diesel engine has a 15.4 to 1 compression ratio. The heavy-duty construction includes a counterbalanced crankshaft, seven precision replaceable bearings, replaceable hardened cylinder sleeves, conduction cooled aluminum alloy pistons and chrome plated top piston rings. The UD-525 also has dependable, all-weather starting; a precision fuel injection system; long-life, full pressure lubrication, and controlled temperatures for top efficiency.

Full specifications and performance charts on the UD-525 are included in the new pamphlet, as well as a listing of available attachments. The booklet may be obtained free of charge by writing to Consumer Relations Department, International Harvester Company, 180 North Michigan Avenue, Chicago 1, Ill.

Power and speed have been increased in the International UD-264 four-cylinder diesel power unit. The unit is now in production at 55 net horsepower at 1800 rpm. Previously, operation above 1600 rpm was available only with engineering approval. At 1600 rpm, the unit develops 52 horsepower. Despite the increase in power and speed, there is no change in the price of the UD-264.

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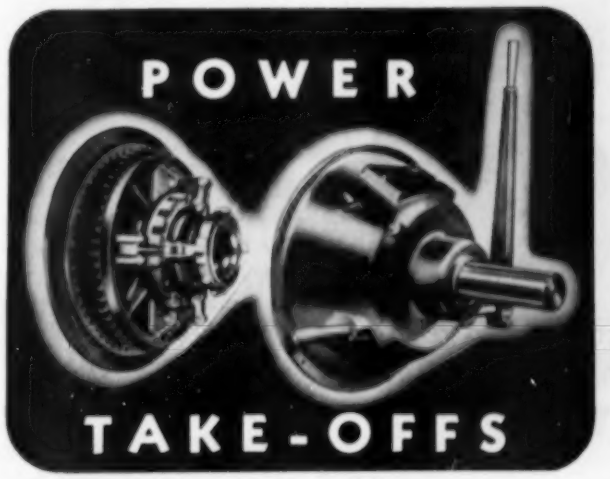

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## What's Going On In England

*. . . continued from page 45 . . .*

heat available for a particular engine usually will be carried out upon request by the makers of the diesel.

In general, it can be assumed that some 29% of the total heat in the original fuel appears as heat in the exhaust gases of the oil engine. In the case of four-stroke engines, an exhaust temperature of 700° to 750°F. is normal at full load, but on two-stroke designs, this figure often falls to 500/550°F. owing to the effect of the scavenging air which dilutes the exhaust gases as they mix. The percentage of dilution and consequential effect on the waste gas temperature varies with different designs of engine. The degree of extraction by steam-raising or by water-heating is determined by the temperature of the steam or water concerned. The higher the temperature of the product, the lower the available range of heat extraction. Assuming exhaust gases to be cooled by the waste-heat boiler to 400°F., which is the figure compatible with a boiler steam temperature of say 330°F., the latter representing a working pressure of 90 psi, then the proportion of the total heat in the exhaust gases theoretically available as steam would be as follows for the four-stroke engine:

$$\frac{725 - 330}{725} = .54$$

For the two-stroke engine it would be:

$$\frac{525 - 330}{525} = .37$$

Assuming in each case that the engine takes .4 lb of 18,900 BTU fuel per bhp/hr., and allowing 5% for radiation and other losses, the heat recovery per bhp/hr. will be as follows on the four-stroke engine:

.54 x .29 x .4 x 18,900 x .95 = 1120 BTUs

On the two-stroke engine:

.37 x .29 x .4 x 18,900 x .95 = 770 BTUs

Converting thermal units into pounds of steam from and at 212°F., these figures become 1.16 and 0.8 respectively. These are fairly representative figures for both types of engines with waste heat boilers operating at 90-lb. pressure.

A true understanding of the whole situation as affecting waste heat recovery on oil engines can best be given by a quantitive investigation of the combustion of the fuel. Taking as a typical case a diesel oil containing 86% carbon and 12% hydrogen, allowing 2% for impurities and moisture (both of which are neglected in the subsequent calculations as they have little bearing on the final results), we get the following net calorific value of fuel per lbs:

| | | |
|---|---|---|
| Carbon: | 0.86 x 14,600 = | 12,550 BTUs |
| Hydrogen: | 0.12 x 52,800 = | 6350 BTUs |
| | | 18,900 BTUs |

**(A) Combustion Table—Theoretical Air Supply for Diesel Oil Combustion Products**

| | Weight per lb. oil | Oxygen required for theoretical combustion cu. ft. | Oxygen required for theoretical combustion lb. | $CO_2$ cu. ft. | $CO_2$ lb. | Water Vapor cu. ft. | Water Vapor lb. | Nitrogen cu. ft. | Nitrogen lb. |
|---|---|---|---|---|---|---|---|---|---|
| Carbon | 0.86 | 25.8 | 2.3 | 25.8 | 3.16 | ..... | ..... | 98.5 | 7.7 |
| Hydrogen | 0.12 | 10.8 | 0.96 | ..... | ..... | 21.6 | 1.08 | 41.0 | 3.2 |
| | | 36.6 | 3.26 | ..... | ..... | ..... | ..... | 139.5 | 10.9 |

(By courtesy of Spencer-Bonecourt-Clarkson Ltd. London.)

Air required for theoretical combustion: (a) By volume: 36.6 + 139.5 = 176.1 = (say) 176 cu. ft., (b) By Weight: 3.25 + 10.9 = 14.16 = (say) 14.2 cu. ft.

**(B) Table of Combustion Products per Lb. of Oil with Varying Percentages of Excess Air**

| Excess air % | $CO_2$ | $O_2$ | Total Volume Water as Vapor | Total Volume Water Condensed | % "as measured" $CO_2$ | % "as measured" $O_2$ |
|---|---|---|---|---|---|---|
| 0 | 25.8 | ..... | 186.9 | 165.3 | 15.6 | ..... |
| 50 | 25.8 | 18.3 | 274.9 | 253.3 | 10.2 | 7.25 |
| 100 | 25.8 | 36.6 | 363.9 | 341.3 | 7.5 | 10.7 |
| 150 | 25.8 | 54.9 | 450.9 | 429.3 | 6.0 | 12.8 |
| 200 | 25.8 | 73.2 | 538.9 | 517.3 | 5.0 | 14.2 |

(By courtesy of Spencer, Bonecourt-Clarkson Ltd. London)

The total volume "water condensed" is the figure used in assessing $Co_2$ and $O_2$ percentages, as the vapor is condensed and appears as liquid water of negligible volume was measured by an Orsat or similar apparatus. For convenience, the relations between excess air, $CO_2$ and oxygen are plotted and graphed in Fig. 2. The foregoing figures enable us to study properly all problems relating to waste heat recovery from diesel exhausts.

Following are two typical examples:

Case 1.—Four-stroke diesel at full load.

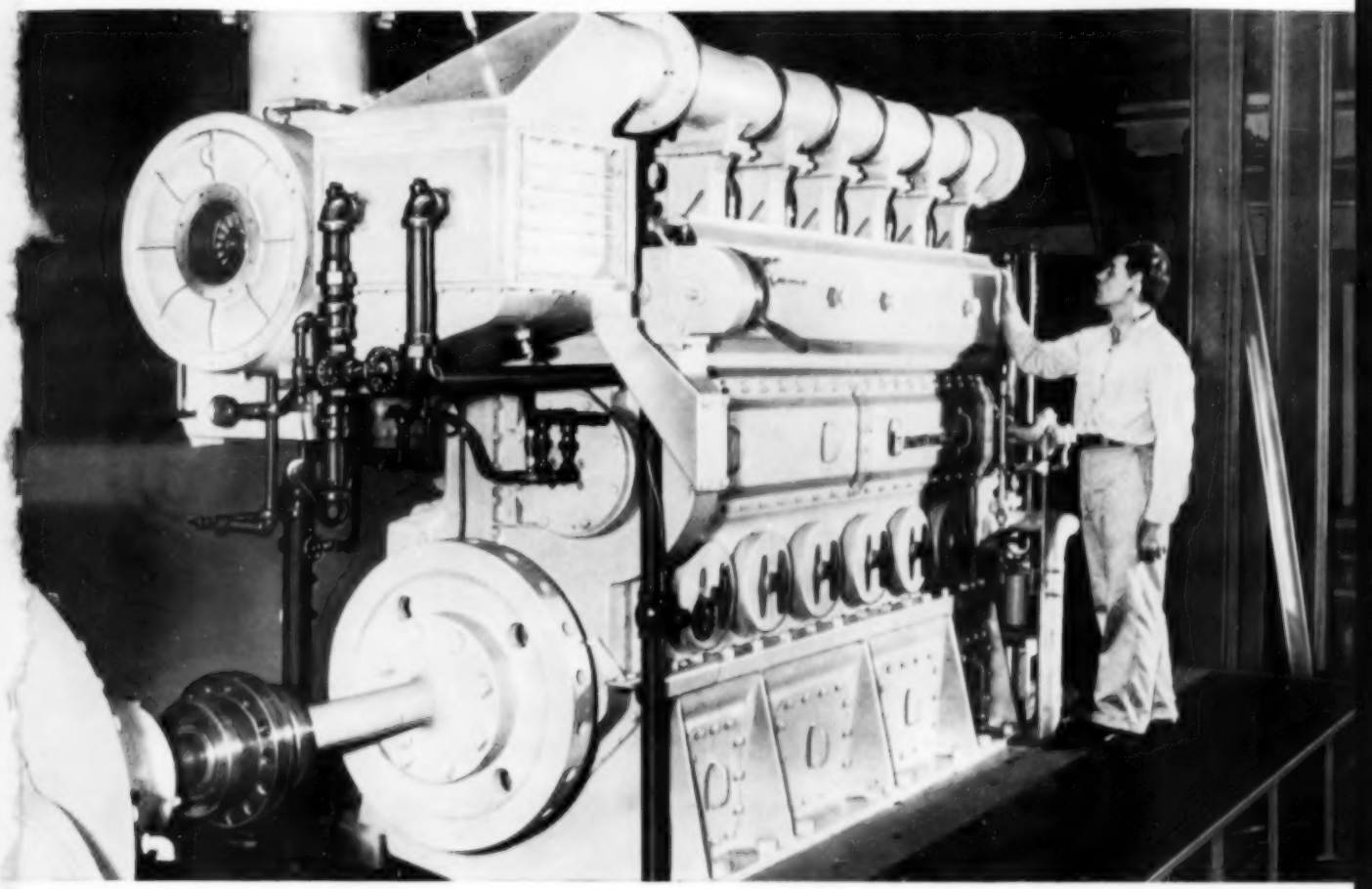
Fuel consumption .....4 lb/bhp/hr.
Waste gas temperature at boiler $T_1$.....740°F.
Boiler working pressure.....160 lbs. per sq. in.
Corresponding saturated steam temperature 370°F.
∴ Suitable waste gas temperature leaving boiler $T_2$ .....370°F. plus (say) 70°F. = 440°F.
$CO_2$ in waste gases.....6.75%
∴ Corresponding excess air.....125%
Radiation, etc. loss (say).....5%
∴ Net recovery.....100 − 5 = 95%
Weight of gases/lb. of oil corresponding to 125% excess air.....15.14 + 17.7 = 32.84 lb.
BTUs recovered by boiler per bhp per hour = weight of gases per hour times temperature drop °F. times specific heat times 0.95. Take specific heat between limits of temperature worked to = 0.24
∴ BTUs bhp/hr. − .4 x 32.84 x (740-440) x .24 x .95 = 900
∴ Steam/bhp/hr. − 900 ÷ 970 = .93 lb. from and at 212°F.

Case 2.—Two-stroke diesel at full load.

Fuel consumption.....4 lb/bhp/hr.
Waste gas temp. at boiler $T_1$.....550°F.
Boiler working pressure.....35 lb. per sq. in.
Corresponding saturated steam temperature 280°F.
∴ Suitable waste gas temperature leaving boiler $T_2$ .....280 + 70 = 350°F.
$CO_2$ in waste gases.....5%
Radiation loss (say) .....7.5%
(larger boiler for given output than on 4-stroke engines)
∴ Net recovery .....92.5%
Weight of gases per lb. of oil 15.14 + 28.32 = 43.46 lb.
BTUs/bhp/hr. recovered by boiler (assume formula as for Case 1). .4 x 43.46 x (550–350) x .24 x .925 = 770.
∴ Steam per bhp per hr. = 770 ÷ 970 = .8 lb. from and at 212°F.

The above figures are typical of good practice on the two types of diesel engines, and show how examples can be readily worked out for any particular combination of conditions. The influence of boiler working pressure on the final steam yield will be particularly noted, and in this connection Fig. 3 has been prepared, based on the relevant data used for Cases 1 and 2.

# WORTHINGTON ANNOUNCES



NEW W9 ENGINE. Available as straight Diesel, dual-fuel, or spark-ignition gas engine, with or without turbocharging.

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FOR HIGH OUTPUT EFFICIENCY. Aerodynamically perfect passage gives minimum flow resistance. Directional baffle imparts swirling motion to air entering cylinder for perfect combustion fuel-air mixture.

# new, heavy-duty 400-1400-hp W9 engine

## for continuous service

The new Worthington W9 engine is designed and built for minimum possible weight consistent with heavy-duty service.

It's a true, continuous heavy-duty engine, yet compact enough for portable, semi-portable, standby or emergency and marine power service. A welded steel base makes it easy to adapt to existing foundations, trailer or railroad-car frames, or drilling rig structures.

What's more, the W9 features the newly developed Worthington Jet-Swirl air intake (*left*) that produces controlled turbulence in the cylinders for best mixture of fuel and air for fuel economy. Streamlined passages and directional baffles between double intake valves give the incoming air a swirling motion that ensures fast, complete fuel-air mixture.

Available as a straight oil Diesel, dual-fuel Diesel or spark-ignition gas engine, in four basic sizes, with or without turbocharging. Nominal speed: 900 - 1000 rpm.

TURN PAGE FOR MORE FACTS ➧

# Here's what the NEW WORTHINGTON W9 ENGINE gives you-

## Check these features

1 ***Jet-swirl air intake passages*** give maximum air turbulence for complete fuel-air mixture and best fuel economy.

2 ***Massive crankshaft***

3 ***Hydraulic valve lifters*** eliminate clearance adjustments, give quiet, efficient operation.

4 ***Cast-in-cylinder water jacket*** eliminates sealing rings between crankcase and water jacket — eliminates possibility of lube oil contamination.

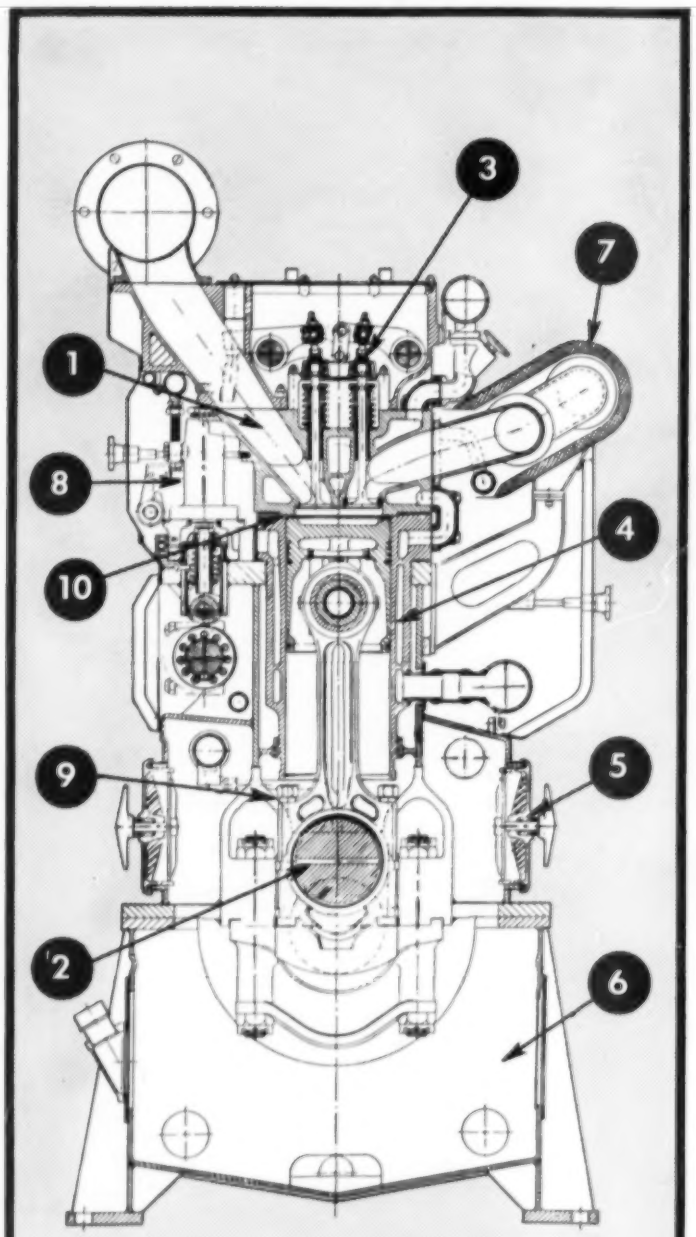
5 ***Large, easily removed inspection doors*** make maintenance easy and do double duty as spring-loaded pressure relief covers.

6 ***Welded steel base*** can be mounted on flat surface or made to suit any existing structure — provides maximum strength with minimum weight.

7 ***Dry insulated exhaust manifold*** reduces cooling water requirement — provides extra energy to turbochargers.

Of course, the new W9 engines have the same features found on larger Worthington engines: separate fuel pumps (8) for each cylinder, four-bolt connecting rods (9) and head design (10) that eliminates need for gaskets.

Get the whole story on the new Worthington W9 engine. Write Worthington Corporation, Section E-5-8, Harrison, New Jersey.




**SECTION THROUGH NEW W9 ENGINE**
**Note particularly the strong, rugged Frame**

# WORTHINGTON

*Economical, Continuous Power — Diesel, Dual-Fuel and Spark-Ignition Engines, from 150 to 5,000 bhp*

## Chicago Power Show

New trends in design will be demonstrated extensively at the Chicago Exposition of Power and Mechanical Engineering, to be held in the Chicago Coliseum, November 14 to 18. The exposition will be held under the auspices of the American Society of Mechanical Engineers and will include a special Atomic Power Exposition climaxing the year-long celebration of the Society's 75th year.

Most remarkable among trends to be revealed at the exposition will be those based on advanced materials and their uses. The effect of these innovations has been to permit many designs to be reorganized basically in terms of higher physical specifications.

The Atomic Power Section will be a new feature at the exposition. It has been organized to demonstrate phases of the application of atomic energy to power that are of special interest to mechanical engineers, and in support of the program of technical papers to be offered at the A.S.M.E. meeting. The atomic energy section of the meeting program will be contributed by the Nuclear Engineering Division, a division recently organized by the Society.

Products on view will further include mechanical packing and seals, expansion joints and molded rubber products in one instance; adjustable pipe hangers and supports in another; a unique method of insulation and corrosion protection for underground piping, in a third. Underground and overhead prefabricated piping for viscous liquids will be seen, as will a newly engineered system of cable and tubing raceways.

Power transmission equipment will be represented by clutches, couplings, hangers, pillow blocks, speed reducers, speed increasers, variable speed transmissions —variety offered in each class. Motors that solve many critical drive problems will account for variety in that classification. In one instance unusual types of alternating current motors will be shown in action; the English manufacturer orginating them is said to be the world's largest ac motor producer.

## Alaska Distributorship

The appointment of a Cummins distributor for the entire Territory of Alaska has been announced by C. R. Boll, vice president-sales, Cummins Engine Company, Inc., at Columbus, Indiana. President of this new Cummins distributorship—Cummins Diesel Sales of Alaska, Inc.—is R. B. Newell, former vice president, Cummins Diesel Sales of Seattle, Washington. Headquarters for the new Cummins service and sales organization will be maintained on East 5th Street in Anchorage. A branch will be operated at 1405 Tongrass Street, Ketchikan, while a Seattle office will be opened at 1403 West 45th Street.

## Catalog Offered

A new right angle speed reducer catalog, Bulletin No. 5503, has been announced by Western Gear Corporation at Lynwood, California. The catalog contains essential data and information on spiral bevel-helical gear type speed reducers as an aid to engineers, designers and users of power transmission equipment. The reducers described are available in a wide range of horsepowers and ratios for any industrial or commercial application. Complete engineering service is also available for their selection and installation.

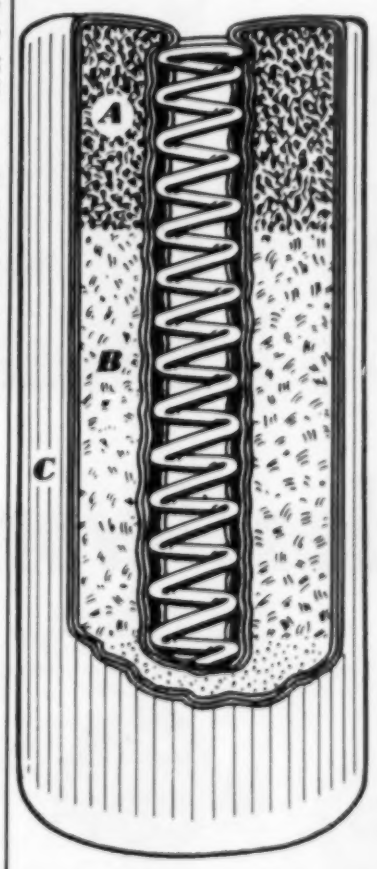
Additional information and a copy of the new catalog may be obtained by writing Ray Conlisk, Industrial Marketing Manager, at the company's general offices, Post Office Box 182, Lynwood, California.


# COMPLETE OIL FILTRATION IS NEVER SIMPLE

by CHARLES A. WINSLOW

**Conditions under which most industrial engines operate may introduce grit, sludge, acid or moisture into lubricating oil. To remove these engine-destroying materials requires FULL FLOW filtration under cold and hot operations, without incurring back pressures, and with complete protection to critical surfaces in case of any part failure. Contaminants must be removed without affecting additives.**

**This complete protection for lubricants is not simple. It can best be accomplished with the four materials combined in Winslow CP* Elements. These elements are also designed for definite and predictable flow and pressure characteristics. When they are correctly applied, the oil is *all* filtered under *all operating conditions,* through these successive steps:**




(A) CP* Material accepts varying percentages of oil flow, to maintain acceptable pressure.

(B) Combined thread and cellulose absorbs moisture and gums.

(C) The patented outside wrapper is an effective filtering medium.

### CP* Material Gives Automatic Pressure Control

***The specially treated CP* material accepts varying percentages of the total oil flow, as conditions dictate; thus maintains acceptable pressure losses without opening by-pass valves, and insures 100% Full Flow filtration at all times. All harmful particles are removed from the oil.***

### Cotton Thread Combined With Cellulose Fibre

**The cotton thread is porous and fluffy for full dirt retention, and creates a multitude of intricate passages to catch minute particles. It is combined with clean, dry cellulose fibre, which prevents packing and channeling of the filtering media. This selected fibre also absorbs gums, moisture and varnish that may be present in the oil.**

**The fourth filtering media is the patented double wrap of tubular cotton on both the inside and outside of the Winslow element.**

### Proportion of Materials Determines Pressure

**In a Winslow CP* Element the ratio of filter materials determines the rate of oil flow through the element. This ratio is set for each size and type CP* element, based on laboratory and field tests.**

### Element Packed for Progressive Filtration

**Each Winslow CP* Element has the same amount of material at the outer area as there is near the center. Obviously the material is more condensed at the center. This forms V-shaped traps for progressively smaller particles, increasing the capacity and useful life of the element. The tubular cover is also squeezed tighter at the center and is more open at the outside.**

**This combination of exclusive Winslow features and materials has been proved for years, under severe engine service, to be the most efficient and in the long run, the most economical method of lube oil filtration. We will be glad to give you complete data on filters and elements for your equipment. Please write or call the nearest office.**

WINSLOW FILTERS

*CP is fully protected by patents and trademarks

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California

## Mid-Continent Diesel News

*By* Jack F. Cozier

SCHULZ AND BRANNAN DRILLING Co., Wichita Falls, Texas, has bought from Mike Carter Engine Works, the Stewart & Stevenson Services dealer, a series 6-110 GM diesel engine to repower a Wilson single engine Giant draw works and a 14,000 Wheland mud pump.

WRAY WIBLE, Sherman, Tex., purchased a Cat D-342 power unit from Darr Equipment Co., Dallas, Tex., for a crusher in Denison, Texas.

SIGNAL DRILLING CO., Tulsa, Okla., has purchased a 86-A Unit rig powered by two Buda 8MO-1290 natural gas torque converters for use in the Rocky mountain area from Buda Engine & Equipment Co., Tulsa, Okla. Signal also purchased through Mid-Continent Supply Co., Fort Worth, Tex., two Buda 8MO-1290 natural gas engines for powering a mud pump.

BANKS CONSTRUCTION CO., El Dorado, Kan., purchased a GM diesel to repower a Chevrolet two-ton truck from Diesel Equipment Co., Wichita, Kan.

COSMO CONSTRUCTION CO., Tulsa, Okla., bought two Euclid 15½-yd. scrapers powered by Cummins NHB diesel engines for use on the northeast toll road. The sale was made by Butler-Sparks Equipment Co., Tulsa, Okla.

MOORMAN CONSTRUCTION CO., Muskogee, Okla., purchased a Cat No. 12 motor grader and a Cat D9 tractor for use on the northeast toll road from the McCormick Machinery Co., Tulsa, Okla.

MISSISSIPPI RIVER FUEL Corp., Poplar Bluff, Mo., bought a K-428 Buda natural gas engine for installation on a generator with the sale being made by Arrow Engine Sales & Service., Inc., St. Louis, Mo.

PIPE LINE SERVICE CO., Seminole, Okla., purchased a CP 600 rotary compressor powered by GM 6-71 diesels for use on the Public Service Co. line from Lindsay, Okla., to Tulsa. Leland Equipment Co., Tulsa, made the sale on this unit.

COSMO CONSTRUCTION CO., Tulsa, Okla., just bought two TD-24 and one TD-18 International crawler tractor for work on the interchange connecting Highways 66 and 33 and the new northeast turnpike east of Tulsa with the Clarence L. Boyd Co., Tulsa, making delivery on the units.

FROZEN FOOD EXPRESS, Dallas, Tex., operates 93 trucks. Some of the trucks are White trucks and others are Auto car trucks with 46 of these trucks being powered by Cummins HRBB and NH diesel engines. FFE operates with direct service in 13 states and connecting service in additional states.

JOY MANUFACTURING CO., Dallas, Tex., has just purchased a Buda 6DA-779 diesel power unit from Buda Engine & Equipment Co., Dallas, Tex., for a drill going to Bagdad Copper Co. in Arizona.

POOLE CONSTRUCTION CO., Shawnee, Okla., bought two Cat #12 motor graders for work on the northeast toll road from McCormick Machinery Co., Tulsa, Okla.

OKLAHOMA PAVING CO., Miami, Okla., purchased a Northwest dragline powered by a GM 4-71 diesel engine from the Diesel Power Co., Tulsa, Okla. The unit will be used on the northeast turnpike.

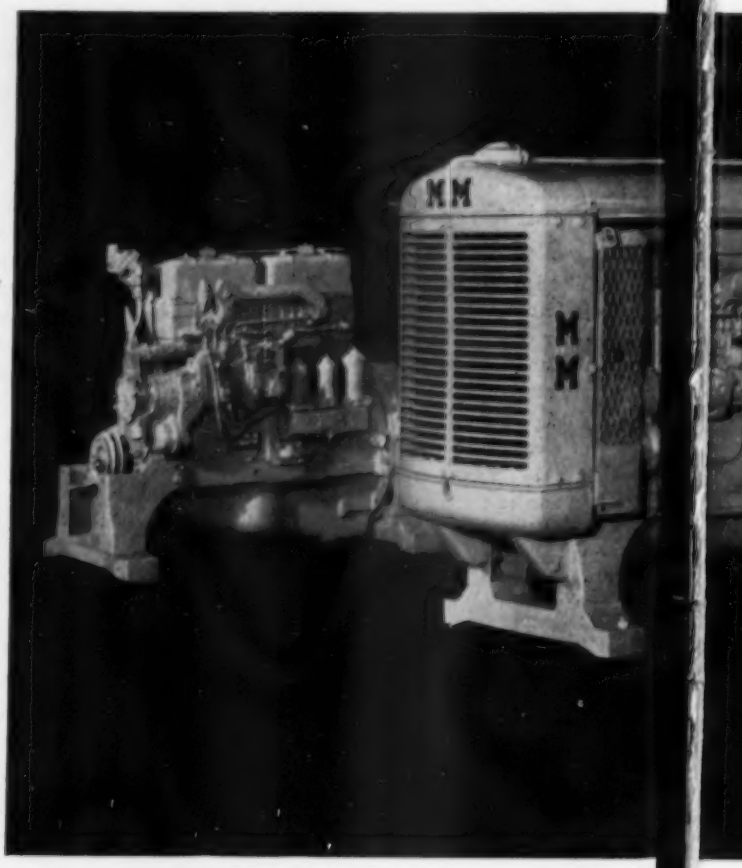
YELLOW TRANSIT Freight Lines, Kansas City., Mo., has purchased 200 Kenworth tractors powered by Cummins


Lanova energy-cell controls combustion.

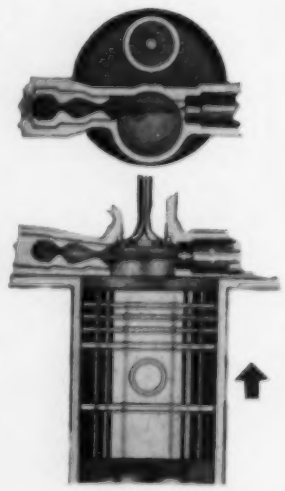
Paired cylinder blocks and heads removable from crankcase.

Continuous-duty work-type construction.

Package unit accessories of integrated design.

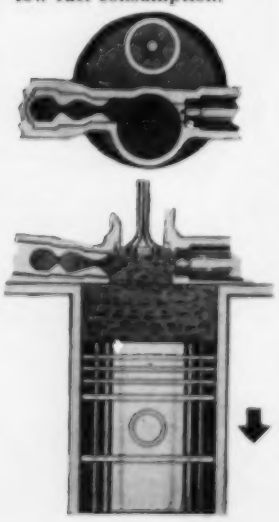


# 17 "ideas" work together



MM controlled combustion features improved injection and reduced peak pressures for lower maintenance cost.

Energy-cell combustion results in complete fuel mixing and exact timing for controlled power and extremely low fuel consumption.



**From top to bottom new Minneapolis-Moline Diesels are loaded with an unusual combination of features that work together to deliver a new high in dependable, profitable operation. Here's the check list of complementing "ideas" which exceed ordinary precision and quality requirements, actually push service dates apart, push cost charts down.**

**MM Diesels offer:**

- Manifold crankcase ventilation
- Removable energy-cell combustion
- Self-cleaning pintle-type nozzles
- O-ring nozzle seals
- Two coolant directors for each

MINNEAPOLIS MOLINE MM MODERN MACHINERY

JBT turbodiesels. In addition Yellow Transit has purchased 400 trailers to help serve their eight state area.

IVERSON SUPPLY CO., Oklahoma City, Okla., bought a GM model 62400 RA diesel for resale to the Al Johnson Drilling Co. to power a mud pump. The engine came from the Diesel Equipment Co., Wichita, Kan.

BELL ENGINE SERVICE, Great Bend, Kan., purchased three 8MO-1290 Buda natural gas engines for irrigation service in Western Kansas, with the sale being made by Buda Engine & Equipment Co., Tulsa, Okla.

W. M. JAGOE CO., Denton, Tex., purchased from the Darr Equipment Co., Dallas, Tex., complete power for a portable asphalt plant consisting of: a Cat D-318, a Cat D-339, a Cat D-342, a Cat D-342 electric set and a Cat D17000 generator set.

MATZENBACKER & ELLIXSON, Casey, Ill., has purchased a Buda HP326 butane engine from Arrow Engine Sales & Service, Inc., St. Louis, Mo., for an oil spudder.

STANDARD PIPE LINE CONSTRUCTION, Cushing, Okla., just bought a Cleveland 140 trencher for work around Sterling, Colo. The unit, sold by Leland Equipment Co., Tulsa, Okla., is powered by an International UD-350 diesel.

J. W. MOORMAN & SONS, Muskogee, Okla., purchased an International TD-24 torque converter crawler tractor for work on the northeast turnpike from the Clarence L. Boyd Co., Tulsa, Okla.

OIL WELL SUPPLY CO., Dallas, Tex., has purchased three Quad GM series 71 diesel engines from Stewart & Stevenson Services to power a new oil well 96 drilling rig for Fryer-Hanson Drilling Co., Dallas, Tex.

CHEMICAL PROCESS CO., Breckenridge, Tex., oil well service company, recently purchased 26 Cummins NHRPS diesels to power specially designed triplex pumps for new pump trailers recently put into service.

CARL H. Todd Drilling Co., Wichita, Kan., purchased a GM model 122403 diesel with air clutches from Diesel Equipment Co., Inc., Wichita, Kan.

H. C. PRICE CO., Bartlesville, Okla., bought two Cat D7 tractors and one Cat D6 tractor from the McCormick Machinery Co., Tulsa, Okla., for pipe line operation.

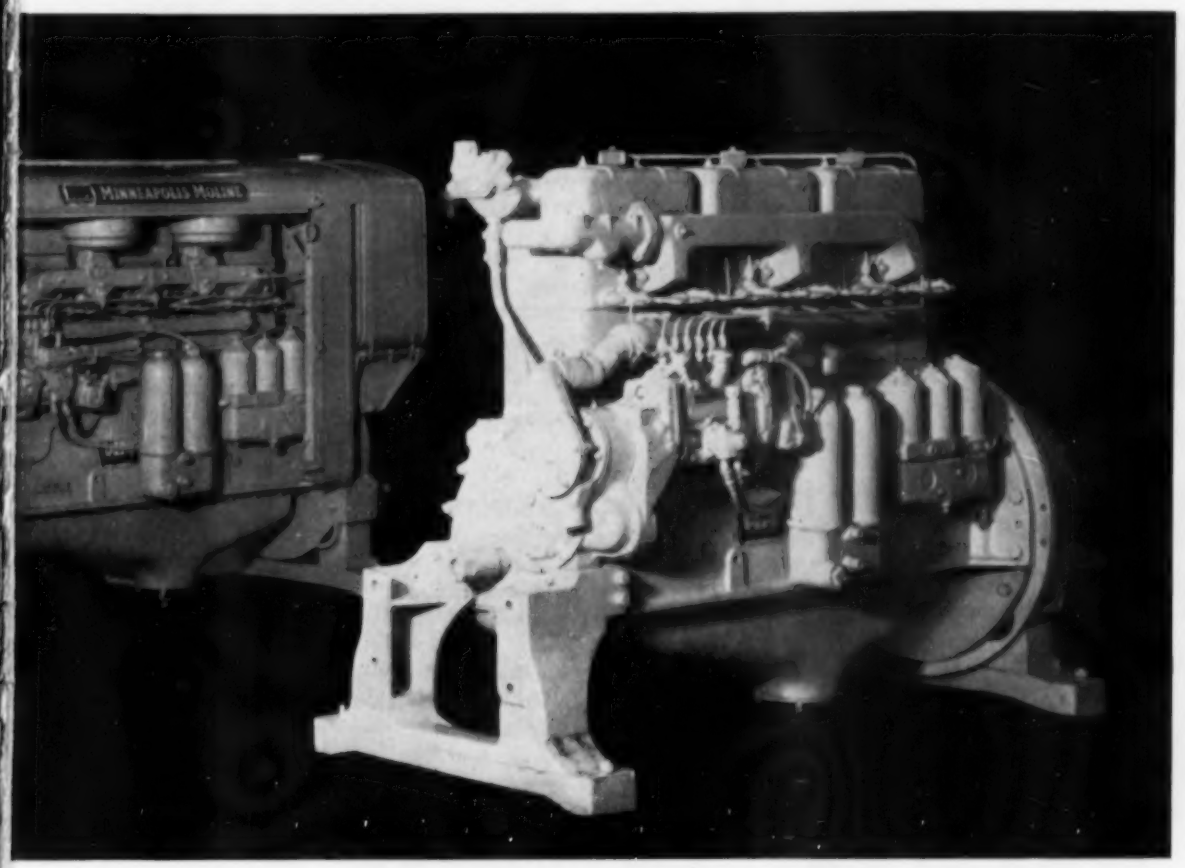
CLEAL T. WATTS, Dallas, Tex., recently purchased a model 3DSP-1R Onan 3,000 watt diesel light plant for lighting on one of his diesel draglines from Buda Engine & Equipment Co., Inc., Dallas, Tex.

MORRISON-KNUDSEN CO., Inc., has purchased a Buda 6DC-1879 diesel engine from Arrow Engine Sales & Service, Inc., St. Louis, Mo., for use in a Bucyrus-Erie 54B shovel at Table Rock Dam, Branson, Mo.

SAND SPRINGS HOME, Sand Springs, Okla., bought a Chrysler IND-30A butane-propane engine driving a Marlow 4E2 self-priming pump for maintenance of water level at their lake from Diesel Power Co., Tulsa, Okla.

MELVIN WINTERS purchased a Cat D-337 power unit for repowering a rock crusher in Kaufman, Tex., from the Darr Equipment Co., Dallas, Tex.

MILLER CONSTRUCTION CO., Olathe, Kan., has purchased three Euclid scrapers powered by three GM 6-110 diesels from the Butler-Sparks Equipment Co., Tulsa, Okla. The units will be put into operation on a water resource dam near Ramona, Okla.

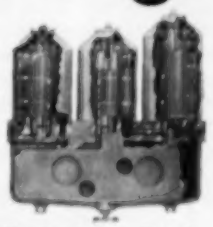



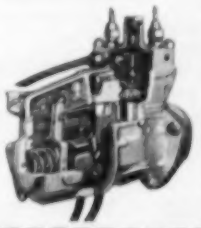

# to offer New Diesel Savings

combustion chamber ◀Stellite exhaust valve seats ◀Removable cylinder blocks (of close grain iron that outlast sleeves) ◀Trunk-type aluminum pistons (camground and tinplated) ◀Drop forged, heat treated connecting rods and crankshafts with ample bearing surface ◀Head and cylinder combustion pressures are transmitted by full length studs anchored in the crankcase ◀Crankcase has extra depth below center line of crankshaft ◀Heavy cast base pan has wide flange that gives effective 360° rear main bearing support ◀Package unit water pump ◀Gravity fuel flow through first and second filters ◀Fuel transfer pump and entire governor included in injection pump package ◀Specially designed torque plate control for each model provides reserve power and reduced fuel consumption ◀Oil filters are crankcase-enclosed or dual full-flow types.

**For your power application it will pay to get fuel facts and specifications on Minneapolis-Moline Diesels —the engines that make "ideas" work for you. See your MM dealer-distributor or write for complete Diesel facts.**

Compact 3-stage filter unit with easy access for service.





Single-plunger Bosch injection for minimum maintenance and safety-bypass return to fuel tank.

**MINNEAPOLIS-MOLINE**
**MINNEAPOLIS 1, MINNESOTA**

**MINNEAPOLIS-MOLINE, DEPT. D2**
**MINNEAPOLIS 1, MINN.**

Please send me literature on MM Diesels. I'd like the following complete specifications and price quotations:

4 cyl. 283 cu. in. ☐ complete unit ☐ bare engine
6 cyl. 425 cu. in. ☐ complete unit ☐ bare engine
6 cyl. 605 cu. in. ☐ complete unit ☐ bare engine

Name.....
Firm Name.....
Address.....
.....

## Gulf Coast Diesel Notes

*By* Michael T. Pate

McWILLIAMS DREDGING Company, New Orleans, La., has bought from Stewart & Stevenson Services, Inc., of Houston, a General Motors series 110 diesel propulsion unit equipped with 3:1 hydraulic reduction and reversing gear which will be used to repower the tugboat *Connie*. The company also bought a matched pair of General Motors diesels, series 110, which will repower the tugboat *Waterbug*.

SHEFFIELD STEEL Division, Armco Steel Corporation, for its Houston plant has secured from Cummins Sales & Service, Inc., of Houston, a model HRFBI 180 hp Cummins diesel which will be used to repower a Whitcomb yard locomotive.

GULF, COLORADO & SANTA FE Railroad, Somerville, Texas, has bought from Stewart & Stevenson Services, Inc., a General Motors series 71 torque converter equipped diesel which will be used to repower an American crane in the railroad's tie plant there.

OILWELL SUPPLY Division, U.S. Steel Corporation, Dallas, has bought for the account of Standard Fryer Drilling Company three General Motors quad-6 diesel units, each rated at 600 hp, which will furnish prime power on a deep well drilling rig.

LA CASITA FARMS, Inc., Rio Grande, Texas, have bought from the diesel division of Fairbanks, Morse & Company a 10-cylinder 750-hp model 38F5¼ engine which will be used in the company's agricultural development along the Rio Grande river.

CALMES ENGINEERING Company, New Orleans, La., has bought two Stewart & Stevenson PD6 ac generating sets, rated at 6 kw. The generators are driven by 2-cylinder model AV-2 Petter diesels.

HOUSTON - CONTRACTING Company, pipeline construction firm, has bought from Big 3 Welding Equipment Company, Inc., of Houston, five diesel driven 250-amp. Lincoln welding units, each powered by a Hercules model DIX-4D 4-cylinder diesel rated at 40.5 hp. The units are for delivery to the company's spread in New Castle, Ind.

CATE EQUIPMENT Company, Salt Lake City, Utah, has purchased two additional Stewart & Stevenson model 12GD-175 ac generating sets, each driven by a General Motors series 71 twin-6 diesel. These two sets and the one previously purchased are being installed at the Consolidated Uranium Mines, Austin, Nevada, to provide power for the mining operations.

WHITE MOTOR COMPANY, Houston, has purchased from Cummins Sales & Service, Inc., of Houston, a model JBIS Cummins diesel rated at 150 hp. The diesel will be used in fire pump service at the company's Houston plant.

MID CONTINENT SUPPLY Company, Fort Worth, Texas, has bought from Stewart & Stevenson Services, Inc., for the account of Sun Oil Company two model 8-567 Electromotive diesel generating sets. The two 875 hp diesels will furnish dc current for diesel-electric drilling rig drive for the oil company's deep Gulf Coast drilling program.

SOUTHWESTERN ELECTRIC Service Company, Lufkin, Texas, has bought through the diesel division, Fairbanks, Morse & Company, a 6-cylinder, 150 hp model 38F5¼ mobile generating unit.

GALVESTON WHARVES COMPANY, Galveston, Texas, will repower a Brownhoist crane with a General Motors series 71 diesel, secured through Stewart & Stevenson Services, Inc., of Houston.

TODD SHIPYARDS CORPORATION, Houston, Division, is equipping six barges under construction for Diamond Alkali Company each with a model BD-230 Buda ballast pump, bought through Buda Engine & Equipment Company, Inc., of Houston. Each model 90-M self-priming ballast pump is driven by a 45 hp. Buda diesel.

MECOM OIL COMPANY, Houston, has bought through Stewart & Stevenson Services, Inc., a heat-exchanger equipped 2-cylinder GM diesel direct connected to a 20 kw ac generator.

EGYPTIAN AMERICAN OIL Company, Ponca City, Oklahoma, has bought for export a 300 amp Lincoln welding generator driven by a series 71, 2-cylinder GM diesel. The unit was sold by Big 3 Welding Equipment Co., Inc., of Houston.

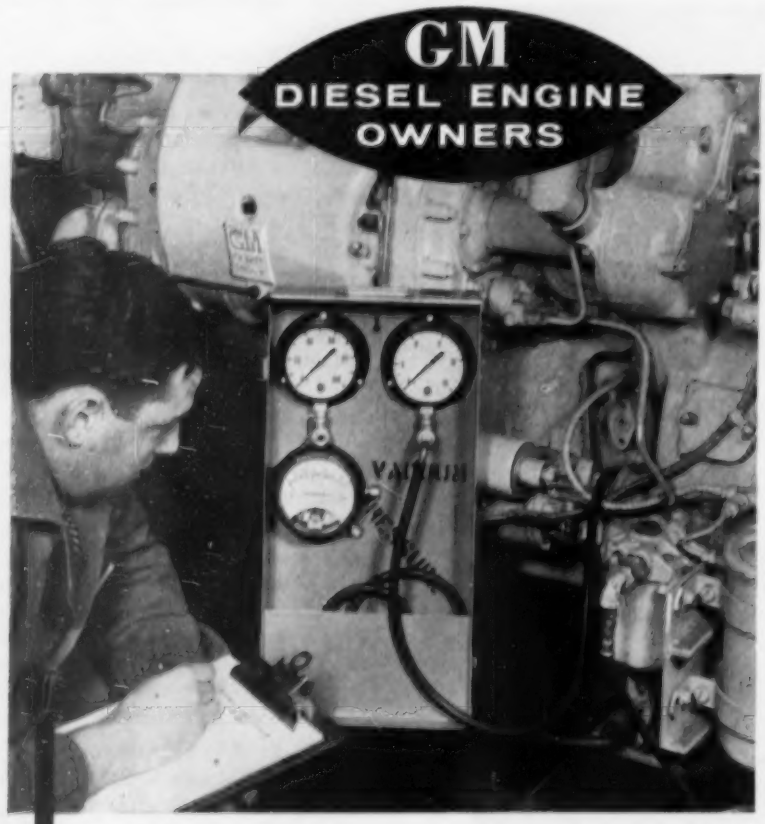
SABINE DREDGE & CONSTRUCTION Company, Port Arthur, Texas, has purchased through Stewart & Stevenson Services, Inc., a series 110 GM diesel which will be used to power a dredge pump.

HOUSTON CONTRACTING Company, Houston, has bought through Waukesha Sales & Service, Inc., a model 135DKU Waukesha diesel, rated 106 hp at 1800 rpm. The engine was for delivery to the company's Houston warehouse.

TODD SHIPYARDS Corporation, Houston, has bought two Stewart & Stevenson model 3MD30 dc generating sets, each powered by a series 71, GM diesel. The 30 kw sets will be used for auxiliary power.

JOHN W. MECOM, Harvey, Louisiana, has secured from Big 3 Welding Equipment Company, Inc., of Houston, 2 model S-7068D Lincoln 300 amp welding machines, each powered by a GM 71 2-cylinder diesel.

IDECO, Beaumont, Texas, a division of Dresser Industries, Inc., has bought two Stewart & Stevenson model 12GD160 ac generating sets for drilling rig auxiliary and lighting. The generators are driven by GM series 71 twin-6 diesels and are rated at 160 kw each.


You'll cut "down time" with the
KENT-MOORE *RATE-MAKER*
Diesel Diagnosis Test Kit

Fact is, you'll reduce diesel "down time" on *two* fronts when your shop is equipped with a portable Rate-Maker Diagnosis Test Kit. First, you'll catch most potential trouble-makers when they're still "potential" by using the kit to run your periodic preventative maintenance checks. And second, if one of those unpreventable breakdowns does occur, the kit provides you with an accurate trouble-shooting tool that'll help you speed repairs by quickly locating the cause of the failure.

Yes, the kit contains all the tools you need to check timing, compression, exhaust back pressure, engine R.P.M., blower intake, restriction, air box, oil and crankcase pressure, and cylinder liner position on all Series 71 and Model 6-110 G.M. Diesel Engines. What's more, it's so compact and convenient you can take it to the job . . . in the shop or out in the field! So cut "down time" in your shop! Order your Kent-Moore Rate-Maker Diesel Engine Diagnosis Test Kit today!

▶ ILLUSTRATED—the J 4209-41 Basic Kit plus fuel pressure gauge and compression gauges for both Series 71 and Model 6-110 Engines. Note that hinged case can be separated for greater convenience in use. Standard Kits available for: Series 71 engines only; Model 6-110 engines only; GMC Trucks; GMC Coaches; and Le-Tourneau-Westinghouse installations. Write for information now!

KENT-MOORE ORGANIZATION, INC.
8-105 General Motors Bldg. • Detroit 2, Michigan
ENGINEERS AND MANUFACTURERS OF SPECIAL AUTOMOTIVE SERVICE TOOLS AND EQUIPMENT

## Ships Seventeen Locomotives

**One of the 17 Alco locomotives being loaded aboard the *Bellis* for shipment to Pakistan.**

A shipment of seventeen diesel locomotives, destined for the North Western Railways of Pakistan, was inspected by high diplomatic and government officials recently aboard the new Norwegian motor ship, *Bellis*. Built by Alco Products, Inc., formerly American Locomotive Company, the 1600-hp diesel units were hoisted aboard the vessel for shipment to Karachi, where they will be placed in immediate freight and passenger service. Among the 35 guests present at a luncheon held aboard the *Bellis* were Sayed Amjad Ali, Pakistan Ambassador to the United States; Laurie Shaffi, Pakistan Council General in New York; S. Hamza Ali, commercial secretary of the Pakistan Embassy, and Lt. Governor George B. DeLuca of New York.

The latest of 51 diesel units which Alco has supplied to the North Western Railways, the new diesels will make Pakistan's rail system one of the most completely dieselized outside of the North American continent. In addition to this shipment, Pakistan has ordered two Alco "World Locomotives" for delivery in September. Also of 1600 hp, this unit is designed expressly for overseas service and is built to operate on any rail clearance in the world.

## Announces Larger Series of Generators

Kato Engineering Company of Mankato, Minnesota, announces a new larger series of generators ranging up to 500 kva. The illustration shows their new Model 92BROR, 500 kva, 400 kw, 3 phase, sixty cycle, 1200 rpm, 220/440 volt generator featuring an overhead belted exciter. The generator is also available with a direct connected exciter. The generator frame is of heavy welded steel construction with endbells being of high grade cast iron. The generator is also available in single bearing design, adaptable to standard SAE bell housings.

This frame size also will accommodate generators from 150 through 300 kw at 900 rpm and also, from 200 to 450 kw at 1800 rpm. Standard voltages are available to 2300 volts. (ITS NEW)

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory section. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

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FORCE FEED LUBRICATORS

● Used by Leading Diesel Engine Builders because of their Dependable Operation through Years of Hard Service.

*Professionally qualified engineering representatives throughout the country.*

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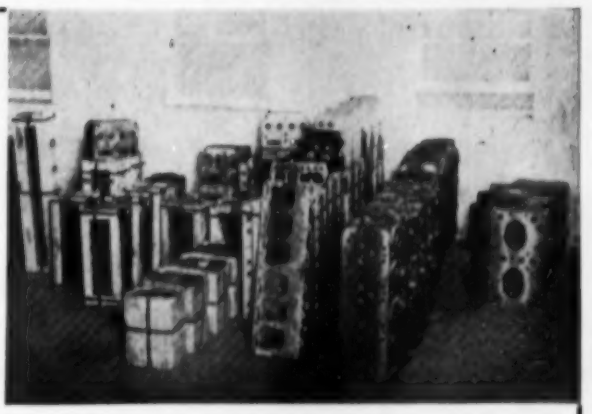
DIVISION OF
HOUDAILLE-HERSHEY CORP.
275 BABCOCK ST., BUFFALO 10, N. Y.

**Immediate shipment . . . no waiting or delays in receiving your reconditioned cylinder head.**

**Heads available for most popular makes of diesel engines.**

**Guaranteed as good as new and up to the manufacturer's original specifications.**

**Surprisingly low cost. You pay only for restoration and shipping.**



DIESEL CYLINDER HEADS

When extended downtime means a serious business loss, call or wire Guth-Pascoe. Guth-Pascoe offers immediate exchange service on most popular diesel engine cylinder heads . . . fully reconditioned, completely guaranteed, ready for instant shipment by the fastest means possible. You get full credit for your old cylinder head upon its return. You pay only the cost of restoration and shipping charges.

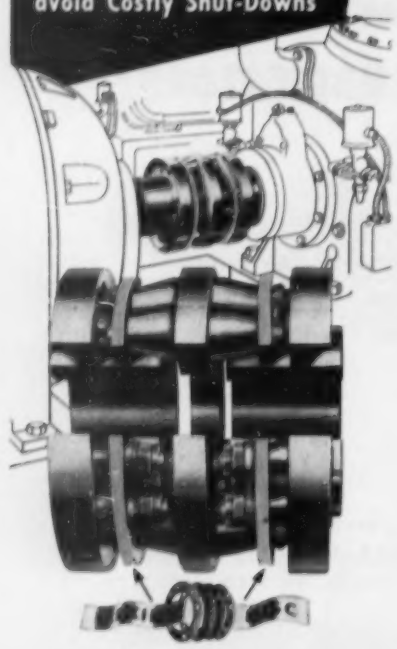
The GUTH FUSION PROCESS is a scientific system of rebuilding broken and cracked castings. Developed and patented in many of its phases by Carl R. Guth, its use is supervised every step of the way by a specially trained expert. Do not discard that old cylinder head. It can be replaced at a small fraction of its original cost. When you have a problem, it will pay you to consult Guth-Pascoe.

GUTH-PASCOE COMPANY

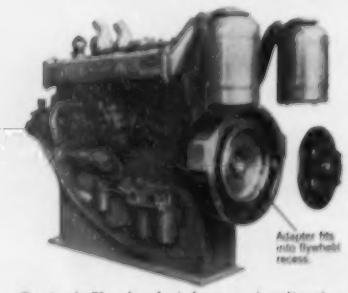
1933 East Washington St., Phoenix, Arizona — Phone Alpine 4-0391

Emergency rush service day or night—Sundays and Holidays included

*Specify* THOMAS ALL METAL
**FLEXIBLE COUPLINGS**
for Power Transmission to avoid Costly Shut-Downs



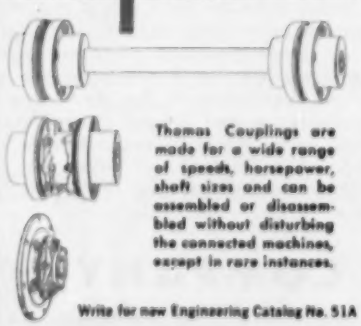
**Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.**




Typical Flywheel Adapter Application

DISTINCTIVE ADVANTAGES

| FACTS | EXPLANATION |
|---|---|
| NO MAINTENANCE | Requires No Attention. Visual Inspection While Operating. |
| NO LUBRICATION | No Wearing Parts. Freedom from Shut-downs. |
| NO BACKLASH | No Loose Parts. All Parts Solidly Bolted. |
| CAN NOT "CREATE" THRUST | Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement. |
| PERMANENT TORSIONAL CHARACTERISTICS | Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained. |

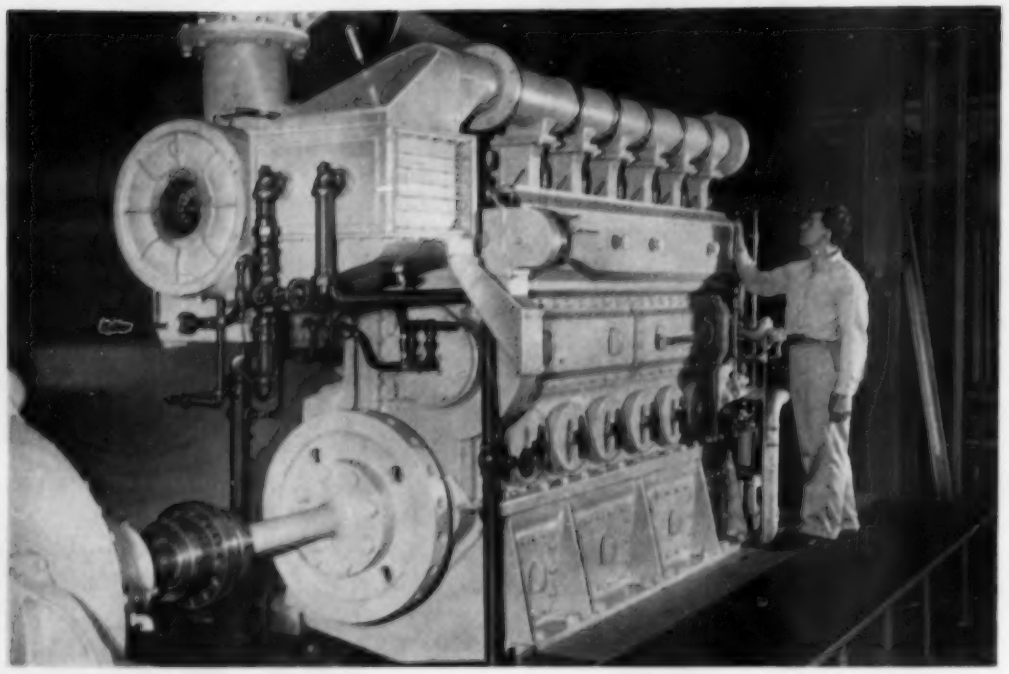


**Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.**

Write for new Engineering Catalog No. 51A

**THOMAS FLEXIBLE COUPLING CO.**
**WARREN, PENNSYLVANIA, U.S.A.**

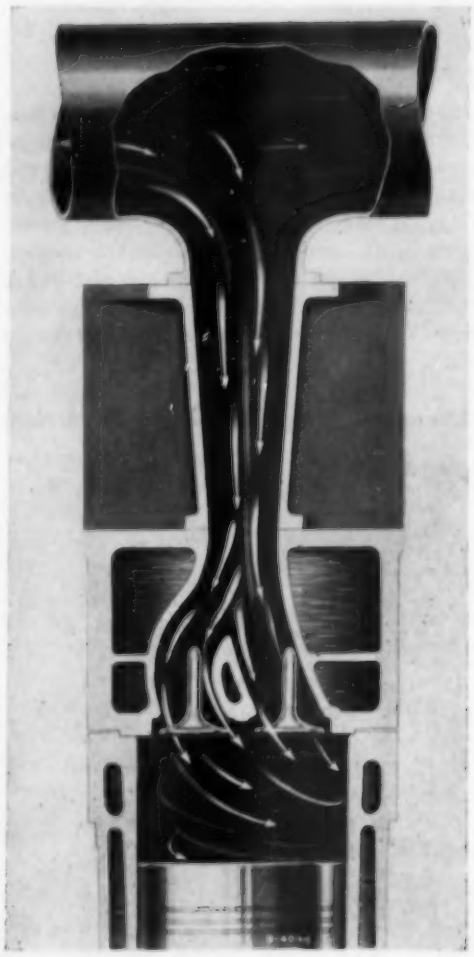

## "Jet-Swirl" Turbocharged Power



A completely new design in moderate speed, 4-cycle, heavy duty diesel, dual fuel, and gas engines with ratings up to 1400 hp has been announced by Worthington Corporation. The new medium speed engines are designed for service in utility and water works, sewage disposal plants, irrigation, chemical and petroleum, marine drives, mining, radio and radar stations, pump or blower drive, and mobile power applications.

Most modern and unique feature of the company's new W 9 line is "Jet-Swirl" turbocharged power. This is a streamlined design for air inlet which brings the air in parallel to the inlet valve stem and gives it a swirl as it enters the cylinder. This new "Jet-Swirl" feature allows ramming larger and more turbulent air charges into the cylinder giving cleaner and more complete combustion. Designed throughout for high pressure turbocharging, the new W 9 is, according to the builder, a new idea in moderate speed, high performance engines capable of outputs up to 1400 hp at 1000 rpm, according to W. E. Wechter, manager of Worthington's Engine Sales Division. The entire engine is structurally designed for operation at higher than 200 psi, bmep.

Welded steel construction of the W 9 affords a low weight per horsepower ratio, thus providing lower building, foundation and installation costs. The new line operates on low cost fuels—residual, crude, and distillate oils, natural, sewage, propane or manufactured gas. Designed for the medium sized power package at permanent installations, the new engines are also adaptable for portable and semi-portable services such as temporary power for oil field services on trailer or rail car mountings. The welded steel frame design still allows the use of cast iron cylinder liners with water packets cast integrally. Crankshaft of the W 9 is hung from the frame; secured by heavy cast steel main bearing caps, and it also utilizes removable precision bearing shells.



Inspection doors and covers are generally sized for easy accessibility for internal parts that may require routine inspection. Precision type oversized bearings on main, crankpin, wrist pin, and cam shafts reduces bearing pressures. Patented features include dual plunger fuel pumps, automatic thermal air control, micro-metering gas valves and self-aligning exhaust valve seat inserts for optimum economical performance. (ITS NEW)

## New Orleans Diesel News

*By* James W. Calvert

LONE STAR CEMENT Co. of Houston and New Orleans has purchased a pair of 600 hp model 37F12 Fairbanks, Morse diesel engines for installation in a river tow boat soon to be built.

FAIRBANKS, MORSE & CO. has sold a 2-cylinder model 32E14 150-hp diesel engine to Plaquemine Parish for installation at Buras, La., near the mouth of the Mississippi River.

A 3-CYLINDER model 49B4½ Fairbanks, Morse diesel unit has been delivered to Stamm-Scheele, Inc. of Rayne, Louisiana.

THE U.S. CORPS of Engineers at New Orleans has taken delivery of a 3-kw model 45B3⅛ diesel generating set from Fairbanks, Morse & Co.

THE NEW ORLEANS Armature Works has purchased a 5¼-hp model 45B3⅛ diesel engine from Fairbanks, Morse & Co.

A 45-FT. TOWBOAT has been built for Volcar Cheramie of Cutoff, La., by Bryant Boats, Inc. of Bayou La Batre, Alabama. It is powered with a pair of 200-hp model 844 Buda diesel engines supplied by Mechanical Equipment Co. of New Orleans. Cheramie's operations are principally centered on the Gulf Intracoastal Canal and in the offshore oil fields of the Louisiana and Texas coast.

THE TUG *SEA HORSE*, owned by Point Landing, Inc. of New Orleans, has been repowered with an Enterprise diesel engine model DMM-363, which will produce 500 hp at 950 rmps.

FOUR ENTERPRISE DIESEL engines, model DMM-363, each rated 500 hp at 950 rpms, have been purchased by the Smith Fish Meal Company to power two twin-screw fishing boats to be used in the Menhaden fishing fleet off the Louisiana coast.

BLUDWORTH SHIPYARD of Houston, Texas has ordered two model DMG-38 diesel engines from the New Orleans office of Enterprise Engine & Machinery Co. The engines, each rated 950 hp at 425 rpms, will power a twin screw river tow boat.

A PAIR of 500 hp Enterprise diesel engines, Model DMM-363, for powering an offshore supply boat to work in the Gulf of Mexico oil fields, have been delivered to Burton Construction Company of Port Arthur, Texas. They were purchased from the New Orleans office of Enterprise Engine & Machinery Co.

DIXIE CARRIERS, Inc., of Houston, have ordered two DMM-383 diesel engines, rated 675 hp at 950 rpms, for a twin screw river tow boat. The engines were sold by the New Orleans office of Enterprise Engine & Machinery Co.

BARKER BARGE Lines has installed two Enterprise diesel engines, model DMM-363, rated at 500 hp, in a twin screw tug.

TWENTY GRAND OIL COMPANY of Morgan City, Louisiana, is powering a new offshore supply vessel with a pair of model DMM-363 Enterprise diesel engines.

### Named Assistant

Herman W. Gambrill has been named assistant to sales manager of Worthington Corporation's Steam Turbine Division, Wellsville, N. Y., according to a recent announcement by A. F. Reinking, general manager. Mr. Gambrill received a Mechanical Engineering Degree from John Hopkins University in 1937 and has been with Worthington Corporation for the past 18 years.

### Adds Aluminum Models to "71" Marine Line

The Detroit Diesel Engine Division of General Motors has added two new aluminum models to its Series 71 line of marine propulsion units. The new engines are four- and six-cylinder vertical units which weigh 350 and 500 pounds less, respectively, than the non-aluminum models of the same horsepower. With their lighter weight contributing to faster vessel speed and shallower draft the new models are especially suited for use in vee-drive yachts and crew boats serving offshore oilwell drilling rigs.

The engines compare in weight with the Division's four- and six-cylinder inclined models and with Houdi dampers installed as optional equipment match the inclined engine ratings of 151 and 235 horsepower at 2300 rpm. The new engines are available in single units or matched pairs. The first public showing of the engine was at General Motors Powerama in Chicago August 31 through September 25.

### Small Size Generating Sets

A new line of small-size, high-capacity Caterpillar diesel-electric sets is described in "Modern Electric Power," a four-page booklet which can be obtained from any Caterpillar dealer or by writing Caterpillar Tractor Co., of Peoria, Illinois. (ITS NEW)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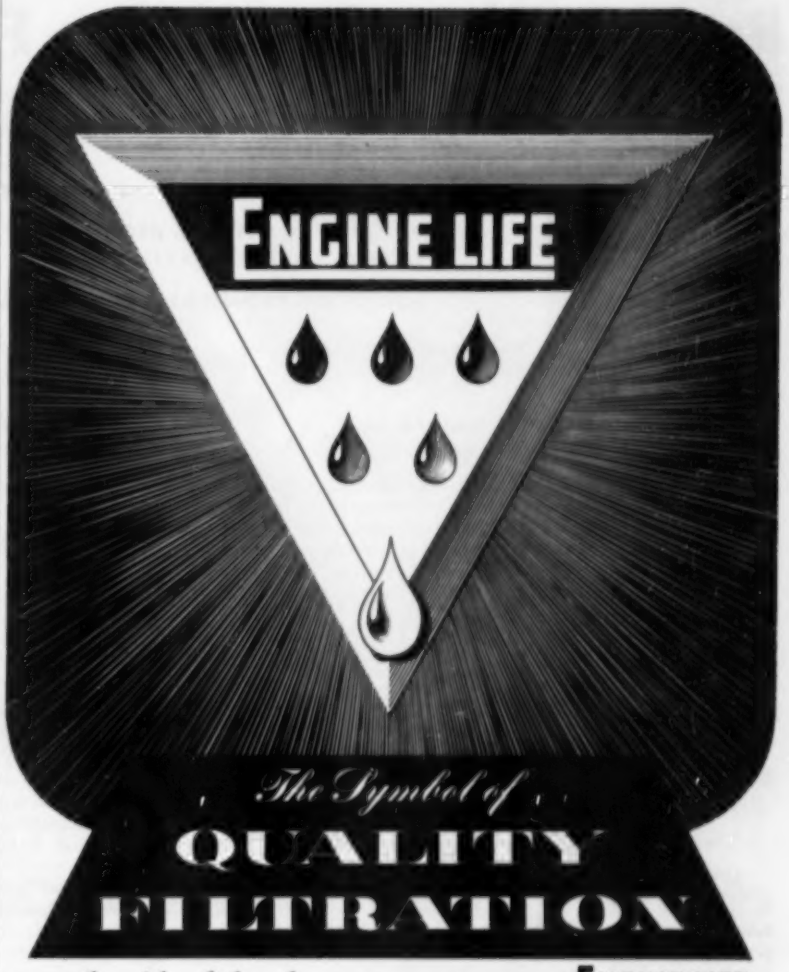
QUALITY

*to protect*

QUALITY

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Engine Life's outstanding performance in the field of filtration is the result of constant proving and improving of the various elements, filtering media and designs in the never-ending quest for perfection. Engine Life's comprehensive coverage of replacement elements and filtering equipment, combined with specialized filter research laboratory and engineering staff, is available to competently determine the best answer to your filtering requirements. Where absolute dependability, quality and performance are essential, Engine Life's modern design filtering equipment and engineered replacement elements are your assurance of the ultimate in oil conditioning.

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ENGINEERED FILTRATION SERVICE

INDUSTRIAL AGRICULTURAL AUTOMOTIVE & MARINE

### To Formulate Policies

The Western Governors Mineral Policies Conference will be held in Sacramento, Calif., November 7-8 for the purpose of formulating and recommending fundamental national policies. The conference is the result of a series of communications between Governor Charles H. Russell of Nevada, chairman of the Western Governors Conference, and Governnor Goodwin J. Knight of California, following lengthy discussions with mineral industry representatives. The governors concluded that sound national mineral policies are needed if a healthy domestic mining industry is to be created and maintained in the interest of national security and the general economy of the United States.

Governor Knight, as the host, is extending conference invitations to members of the mining and mineral-using industries, and state officials of the 11 western states, South Dakota and Alaska. The nucleus for the conference will be the Western Governors Mineral Advisory Council. S. H. Williston of Palo Alto, California, chairman of this council, has been designated as one of the two conference co-chairmen, serving with De Witt Nelson, California State Director of Natural Resources.

Conference planners believes a successful conference will produce at least four major accomplishments. These are: 1. The Western States, acting in unison, can present a strong and politically-important case for consideration at the national level. 2. The conference, organized and sponsored by state governments, can present policy recommendations free from undue influence by special interests. 3.The conference can stimulate thinking by and arouse the interest of not only the representatives of the mining and mineral consuming industries but also the presently disinterested and uninformed public, in the problems of the industry. 4. The Western Governors Mining Advisory Council, a permanent organization, can continuously press for acceptance of its recommendations, provide a ready means of organizing future conferences as new problems arise and old problems persist and coordinate the policies of Western Governors with respect to their mining problems.

# Random Thoughts from a Filter Engineer

*by Charles Meyer*

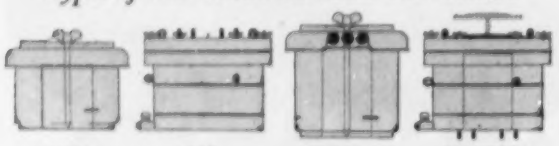
- **MAKING LIFE EASIER FOR ENGINEERS**
- **WHY WE SOMETIMES RECOMMEND LARGER FILTERS THAN COMPETITORS**
- **SOME COMPROMISES ARE NECESSARY**

#### MAKING LIFE EASIER FOR ENGINEERS

We have great sympathy for those engineers who have the job of installing engines in factories. Many plant layouts give them very little room to work in. Often they are faced with the problem of needing a filter of a certain size and having no place to put it. We at Air-Maze have tried to remedy the situation. We've made our oil bath filters in a variety of designs.

Some oil bath filters have an air outlet at the bottom so that the filter can be mounted directly on the intake pipe.

*Types of Air-Maze Oil Bath Air Filters*




Some have an outlet at the top so that the filter can be suspended from an elbow. Others have an outlet at the side to attach to the horizontal piping from the engine.

In addition, most of our oil bath designs can be obtained with or without a silencing chamber to dampen engine intake noise. And a number of designs can be obtained with a relief valve to prevent oil blowout from intake pulsation or a backfire relief valve to provide protection against engine backfires.

#### WHY WE SOMETIMES RECOMMEND LARGER FILTERS THAN COMPETITORS

Sometimes a prospective customer asks us why we recommend a larger filter than a competitor does. Especially when the competitor claims his filter will do the job. It all goes back to something we learned a long time ago. When recommending a filter for a particular installation, select the filter that will handle the *velocity*, not just the *volume*. There's an old saying in the trade: the only language a filter understands is air velocity. Just as a bridge must be designed for the greatest load it will have to sustain, so a filter must be selected for the greatest velocity it will have to take at any given moment.

There's no problem selecting a filter for turbochargers and blower-type scavenging devices. They provide a relatively constant flow of air. But with compressors, slow speed engines and scavenging pumps (particularly where there is an overlap of pistons), the air flow at one instant may be much greater than the average flow per minute.

Air-Maze was one of the first to recognize this situation. We've devised formulae, based on hundreds of tests, that helps us select the proper filter. That's why we occasionally recommend a larger filter than may seem necessary or a larger one than a competitor may recommend. Experience shows that the larger filter avoids such future difficulties as oil pull-over or damage from pulsation.

#### SOME COMPROMISES ARE NECESSARY

The word "compromise" has fallen into disfavor in the minds of many people. When we speak of a type of filter being a compromise, they're inclined to think the product isn't as good as it could be. Actually, every type of filter is a compromise. A dry type filter has a certain set of advantages that an oil bath filter doesn't have. To gain one quality you often have to sacrifice another. It depends upon *which* set of qualities you want in a filter.

For instance, a dry type filter can be designed to provide very high efficiency with small air-borne particles where it's important that the filter have no oil coating. It's ideal for carbon ring compressors where no oil can be tolerated. When a filter must be installed in anything but a vertical position, dry filters should be used. For example, an aircraft in inverted flight. Or any equipment that has a tilt of over 30 degrees. And a dry filter may be better than an oil bath filter in areas of extremely high dirt concentration because oil bath filters can't wet and collect the dirt fast enough.

*Dry filter vs. Oil bath?*

But a dry filter doesn't have the dirt holding capacity of an oil bath filter. Our 6500 CFM capacity oil bath filter can hold over 100 pounds of dirt. And it's not affected by high humidity conditions or oil fumes in the air. Oil bath filter media is permanent. In normal operation, it doesn't need replacement. But dry type filter media needs cleaning and eventual replacement.

We at Air-Maze have no ax to grind. We make both dry type and oil bath filters. Regardless of which set of advantages your filter installation calls for, we have the filter to do the job. The Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

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*The Filter Engineers*

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

### Eastern District Sales Manager

E. H. Schoonmaker was recently appointed eastern district sales manager for Baldwin-Lima-Hamilton Corporation, Philadelphia, Pa. Formerly associated with Baldwin's St. Louis office, Mr. Schoonmaker will make his headquarters in New York, at 60 E. 42nd Street. W. A. McKnight of the company's Houston, Texas, office, goes to St. Louis as manager of Baldwin's sales office there. The St. Louis office is at 1221 Locust Street.

### Eliminates Over 95% of Noise Energy

Noise caused by pressure reduction operations can be controlled in natural gas distribution and steam systems. Pipe ring and resultant noise radiation within the regulatory system and over the surrounding area can be effectively eliminated by using the newly developed and successfully applied Burgess-Manning PRS pressure reduction silencer, according to the maker. The manufacturer states that the PRS pressure reduction silencer removes removes 95% to 99% of the noise energy created by pressure reduction operations. It is said that noise reduction at critical outdoor locations in gas distribution systerms range from 18 to 25 db. The PRS silencer is installed in the downstream piping in close proximity to the reduction valve.

For complete information, write to Burgess-Manning Company, 749 East Park Ave., Libertyville, Ill. (ITS NEW)

## Michiana Products Corp.

The outstanding common stock of the Michiana Products Corporation has been purchased by its president, Nathaniel E. Duval, and a group of well-known businessmen. The group includes: Ralph W. Applegate, Arthur S. Bowes, J. Arthur Friedlund, Dan Topping of New York City, and the banking firm of H. M. Byllesby & Company.

Michiana Products Corporation, which has been located in Michigan City, Indiana since 1919, is one of the world's largest producers of diesel oil filters for locomotives and power plants. The Oil Filter Division also manufactures filters for trucks, tractors and the automotive industry. The Steel Fabricating Division manufactures farm equipment, tanks, road-graders and heavy weldments, as well as aluminum and stainless steel products. The Alloy Foundry Division produces high alloy castings of nickel, chromium and other non-ferrous metals.

Mr. David A. Crawford, former chairman of the Board of Directors of Michiana Products Corporation, has retired and Nathaniel E. Duval, president, has assumed the chairmanship, and will continue as chief executive officer. Other members of the Board of Directors are: Ralph W. Applegate, Arthur S. Bowes, M. L. Bengston, Joseph H. Briggs, Georges H. Dapples, Joseph E. Duval, J. Arthur Friedlund, Arnold M. Johnson and Frank B. Schmick.

## New Officers

The Board of Directors of The Electric Products Co., Cleveland manufacturer of motors and generators since 1909, announces the elevation of Dr. W. A. Thomas to vice president in charge of engineering, of J. R. Williams to vice president in charge of manufacturing, of R. J. Berry to secretary-treasurer, and of R. A. Morey to assistant secretary and assistant treasurer.

## Heads Detroit Sales Office

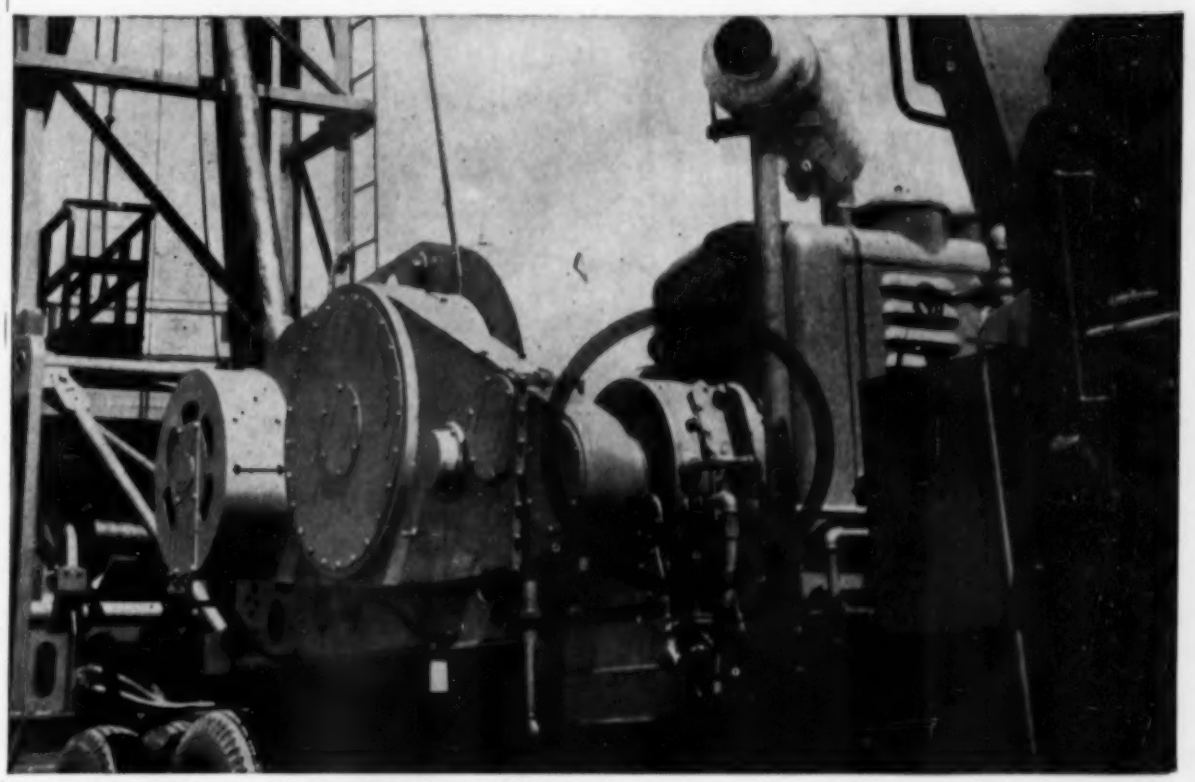
Roots-Connersville Blower, Division of Dresser Industries, Inc., Connersville, Ind., has established a Detroit sales office at 4917 Schaefer Road, Dearborn 2, Michigan. According to the announcement made by D. A. Johann, RCB vice president, Daniel R. Fulton heads the new office. His appointment became effective on June 1.

Mr. Fulton, associated with the company's Chicago district sales office for the past five years, assumes responsibility for the organization and management of the sales territory assigned to the Detroit office. Prior to the establishment of the Detroit sales office, the sale of Roots-Connersville products was handled by Mr. A. G. Bradbury who retired recently because of ill health. Roots-Connersville products include: centrifugal and rotary positive blowers, exhausters, gas meters, inert gas generators, vacuum pumps and spiraxial compressors.

## Orders Locomotive

Savannah & Atlanta Railway, Savannah, Ga., recently ordered a 1600 hp diesel-electric locomotive from Baldwin-Lima-Hamilton Corp., Philadelphia, Pa. The new unit is a Model AS-416 All Service locomotive suitable for general switching or high-speed main line service. It will incorporate an 8-cylinder supercharged diesel engine. Four of its six axles will be motorized to produce a tractive effort of 44,000 pounds at 25% adhesion.

**IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.**



Your Torcon-equipped power plant operates at its most efficient speed.

# Self-contained oil circuit keeps TORCON efficiency high

This simple design feature is a big factor in keeping TORCON efficiency consistently high: the oil sump is an integral part of the housing—no complicated oil seals to lessen efficiency and complicate maintenance. Oil passages are cored in the housing—no extra hoses and fittings.

Easy accessibility is valuable, too. Simply remove two cover-plates, and the whole unit is fully exposed for inspection and service—no special tools needed.

The Clark-Torcon is a complete unit, mass-produced, available off-the-shelf to engine and original equipment manufacturers, and to owners and operators. It's the broadest line available to industry, with a wide range of wheel diameters and a complete choice of options, for easy fitting into any torque-transmission system.

*There's a Torcon to FIT YOUR NEED*

This fully illustrated, easy-to-read bulletin explains torque multiplication clearly; and indicates its many industrial applications. Use the coupon to get your copy.

## A Complete Quality Line—Clark-Torcon

**All Sizes**—from 15 to 600 H.P.

**Broad Range of Options**—readily adaptable to many applications

**No Cavitation**—proper oil flow prevents turbulence and formation of air pockets to cause wear and loss of efficiency

**High Efficiency over wide range**—more work done, and reduced wear on components

**Individually Cast One-Piece Elements**—no welds or fabrications to distort under extreme loads

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CLARK EQUIPMENT

**CLARK EQUIPMENT COMPANY**, Jackson 2, Michigan: Please send the CLARK-TORCON Bulletin

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## Inland River Reports

*By* A. D. Burroughs

DIESEL TOWBOAT construction on inland rivers has reached a new peak this season. At Calmes Engineering Co., New Orleans, a new one yet unnamed is under construction for J. D. Cayton of Houston. Measuring 62 x 21 x 5.6, two 500-hp Caterpillar engines will provide the power. Two 30-kw ac Waukesha diesel generators will be used.

AN UNUSAL towboat-tugboat is being built at the Sturgeon Bay (Wis.) Shipbuilding Co. for Inland Waterways Transportation Co. Designed by A. M. Deering and Son, this boat will be propelled by a 900-hp GM engine with a 2.5:1 reduction gear and Airflex clutch.

THE OHIO River Co. has three more diesel towboats under construction at St. Louis Shipbuilding. The *John J. Rowe*, a twin screw sister boat to the *A. L. Long* and the *Mike Creditor*, is near completion. The triple screw sister named the *Walter C. Beckjord* is slated for early November. Late 1955 will see the *Tom Ragsdale* completed by St. Louis Ship and in action for the Ohio River Co. This single screw boat will have a retractable pilothouse for use on the Illinois waterways. All three new boats will be equipped with the Baldwin-Lima-Hamilton engines.

THE *LADY MIGNON*, similar to *Lady Linda*, is the new twin screw 1800-hp. towboat slated for delivery to Inland Oil & Transport Co. by St. Louis Ship early in 1956. Named for Mrs. Siteman, this vessel is equipped with two GM (Cleveland) Model 12-567 diesel engines driving through Falk 3:1 reverse-reduction gears.

SUPERIOR engines developing a total 1400 hp will power the new *Andrew B.*, also slated for delivery from St. Louis Ship in early 1956 to Cumberland River Sand and Gravel Co. It measures 100x 25x8½.

THREE NEW towboats, all still without names, are under construction at Barbour Metal Boat Works, Lemay, Mo. One will be equipped with 170-hp Caterpillar engine, two with GM (Detroit) engines.

A NEW ONE in action for W. A. Lynn Construction Co. is the *Billy Lynn*, built by Missouri Valley Steel (Leavenworth, Kansas). Powered by GM (Detroit) engines, each rated at 220 hp at 1800 rpm, the 48-inch propellers are turned by a reduction gear ratio of 3.75:1 furnished by Kahlenberg.

A 165-HP Hercules industrial engine is providing dependable duty for pleasure purposes, powering the new towboat, *Mac*, built by Humboldt Boat Service, to propel the pleasure barge Thunderbird on the Mississippi.

THE YEAR-OLD *Ira C. Bill*, owned by Tuel Towing Co., was headed for the Elk River with a tow of steel. She is powered by an International UD-24 engine rated at 200 hp. This same company is completing a new boat built at Newel Cochran Docks (Parkersburg) and will reportedly be powered by a Cummins diesel engine.

WITH THE emphasis upon the new, we also noted with pleasure the 10-year-old boat, *Tom Sawyer*. Using its 1180-hp, developed from McIntosh & Seymour engines, to handle the largest craft to travel the Missouri River in many a year, this old favorite brought up the tow carrying the giant dredge *Western Chief*.

ABOUT THE same time, the 15-year-oldster, the *Virginia*, used her 1600-hp GM engines for a giant tow 960 ft. long and weighing 10,750 tons—reportedly the largest tow ever on the Cumberland.


# New Inet-Palmer 60 cycle ac generators

**–they fit your engine**

Here's the ideal "other half" for a 60-cycle power plant . . . INET-Palmer's new, completely redesigned Series 60 A-C Generators. Flexible, they hook up to *any* standard engine—diesel, gasoline, butane, or natural gas—deliver *precise* 60-cycle power under even the roughest operating conditions. Rugged and dependable, their basic features have been proved by 25 years of desert, oil field, marine, and similar "tough" service. Unusually stable during motor starting, Series 60 A-C Generators are subject to only extremely small voltage dip. Recovering almost instantly, they cause no lighting dimout, service interruption, or motor damage. Series 60 units are normally Auto-Regulated but are also available with external regulation.

INET-Palmer's new catalog on 60-Cycle A-C Generators gives complete descriptions and specifications. Write today for your copy of Bulletin T-8100.

***Compact*** . . . more power per pound, ratings from 5 to 200 KW

***Long bearing life*** . . . light bearing loadings, over-size bearings

***Vibration free*** . . . flexible couplings for isolation from engine

***Heavy-duty insulation*** . . . long life even at ambient temperatures above 150°F.

***Rugged rotor design*** . . . generous safety factors for torsional vibration and overspeed

***Easy assembly*** . . . simplified connection to flywheel and flywheel housing

***Convenience*** . . . large cover plates for access to exciter and generator brushholders

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THE *CELESTE*, built in 1942, and owned by Southern States Barge Lines, left her usual upper Mississippi waters for a trip on the Illinois waterways, getting good performance from her 1600-hp Cooper-Bessemer engines.

THE FORMER *Del Commune* has the new name of *Allegheny* and the same power from Fairbanks-Morse engines.

THE POPULAR *Cap'n Bill Stump* (equipped with Atlas Model 35-S2X-6 engines) has been re-named *Bayou Manchac* and is still owned by the Kanawha Sand Co.

IN RESPONSE to a mail query, the Walker Boat Yard boat *Margaret Richardson* first saw service in 1928 and is powered by a Worthington 80-hp engine.

## New Deflection Indicator

A new deflection indicator for use on any equipment requiring prompt detection of relative motion has been announced by Allis-Chalmers Manufacturing Company. The device is especially adaptable to any shafted machinery, such as marine engines, sewage, irrigation and pipeline pumps, and compressors. Operating on a balanced bridge principle, the indicator consists of two compact inductor coil pickup units which operate on a 60-cycle, 110-volt power source, and control assembly. It has no electronic tubes.

A time delay prevents false warnings caused by vibration of deflection of short duration. The equipment can be easily installed and requires little maintenance. The position of the equipment to which the indicator is attached does not affect its operation. (ITS NEW)

## ASME Diamond Jubilee Meeting

The American Society of Mechanical Engineers launched its 75th Anniversary celebration in February and the Diamond Jubilee Annual Meeting in Chicago November 13-18 will discuss "The Engineer and the World of Commerce and Industry."

Included among the session will be one devoted to the diesel industry on the morning of November 15th. A paper entitled "The Diesel Engine's Progress and Future" will be read, followed by a discussion led by a panel of engineers from leading engine builders and component manufacturers.

## Named to New Posts

Appointment of Hugh L. Ross and Charles L. Babb as assistant manager and chief engineer, respectively, of Allis-Chalmers centrifugal pump department has been announced by H. P. Binder, department manager. Mr. Ross has been chief engineer of the centrifugal pump department since 1945. Prior to that he was engineer-in-charge of pump design for five years. He came to Allis-Chalmers in 1928 after graduating summa cum laude in mechanical engineering from Yale University. He has been active in the affairs of the Hydraulic Institute, the American Society of Mechicanical Engineers, and the Edison Institute.

Mr. Babb, who had been engineer-in-charge of centrifugal pump design, joined Allis-Chalmers in 1924 after receiving his mechanical engineering degree from Purdue University. His papers won prizes in the 1950 and 1954 Steel Founders' Society of America national awards contests.

Both Mr. Ross and Mr. Babb are members of the Engineers' Society of Milwaukee and registered Wisconsin professional engineers. Each holds various centrifugal pump patents.

"...the first nine months WE SAVED $38,969.64!"

—says Mr. Robert J. Dodd, Chief Engineer of Clay Electric Cooperative of Florida.

Add another success story of tremendous savings through the use of residual fuel—purified by De Laval.

Mr. Dodd writes: "Our Worthington Plant has produced 12,753,000 kwhr in the first nine months of this year. By use of No. 6 residual fuel we have saved a total of $38,969.64, an average of $4,329.96 per month.

"The De Laval Purifiers have handled 793,529 gallons, removing about seven tons of injurious material. The fuel has been so thoroughly cleaned that there has been no increase in maintenance cost over what would have occurred with No. 2 fuel."

Interested in cutting power production costs? Investigate the great savings with low-cost heavy fuel oil—purified the *De Laval* way. Write for details...*now*.

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heavy fuel oil purifiers

THE DE LAVAL SEPARATOR COMPANY Poughkeepsie, New York • 427 Randolph St., Chicago 6 • DE LAVAL PACIFIC CO. 201 E. Millbrae Ave., Millbrae, Calif.

## Straws in Today's Business News

BETWEEN November 1955 and May 1956 the Southern Pacific will take delivery of 185 new diesel locomotives from Alco Products, Electro-Motive and Fairbanks-Morse. The value of the 185 units is about $34 million. Their addition will bring to 1846 the number of diesel locomotives owned by SP. Most of the new units will be assigned to main line freight hauling. At present, diesels handle 86% of the line's gross ton-miles of freight, 87% of passenger train-miles, and 81% of yard switching. Information was withheld as to the division of the big order among the three suppliers.

ELECTRIC Boat Division, General Dynamics Corp., has received an order for two more diesel-driven submarines for the Peruvian navy. General Motors engines will be used but the exact specifications have not yet been determined. However, the subs have the same characteristics as the two built last year for Peru by Electric Boat. These had 2400-bhp, 2-cycle, single-acting, non-reversible Type 278A Cleveland GM engines, working on two shafts.

SPEAKING at a Railroad Day luncheon during GM's Powerama in Chicago, James M. Symes, Pennsylvania Railroad president, said the nation's carriers must spend $20 billion in capital improvements within the next 10 years if they are to keep up with peacetime transportation needs. He also said that the diesel locomotive has made "the greatest single contribution to the economic and efficient operation of our railroads during my 40 years' association with the industry." Mr. Symes said his line will test one of GM's new Aerotrains in regular passenger service between Pittsburgh and New York, starting before the end of the year.

A. D. BURROUGHS, Inland Waterways reporter for DIESEL PROGRESS, writes that "inland river shipyards are bursting with activity, building new boats for the ever-growing river traffic. And, naturally enough, all of them will be powered by diesels." . . . James W. Calvert, DIESEL PROGRESS correspondent in New Orleans, says that the offshore oil drilling has increased activity in Gulf Coast shipyards to 50% of capacity as compared with 25% two years ago. He reports that New Orleans capital has been invested in a new company, Continental Shelf Marine Co., to engage in the offshore marine chartering business and that a big order has just been placed for crew and supply boats.

ED DENNIS, who covers Florida for DIESEL PROGRESS, recently completed a swing around his state, visiting nine dieselized utility plants among other calls. He says several are installing new engines to keep up with the growth of the state and that all are faced with the necessity of using bunker C fuel in order to reduce kw costs to consumers. He sees business in this trend for accessory manufacturers in the diesel industry . . . Leo Walter, consulting engineer, who writes news from both England and Europe for DIESEL PROGRESS, attended the Engineering and Marine Exhibition in London and found great activity and interest in diesel engines and accessories among buyers and sellers.

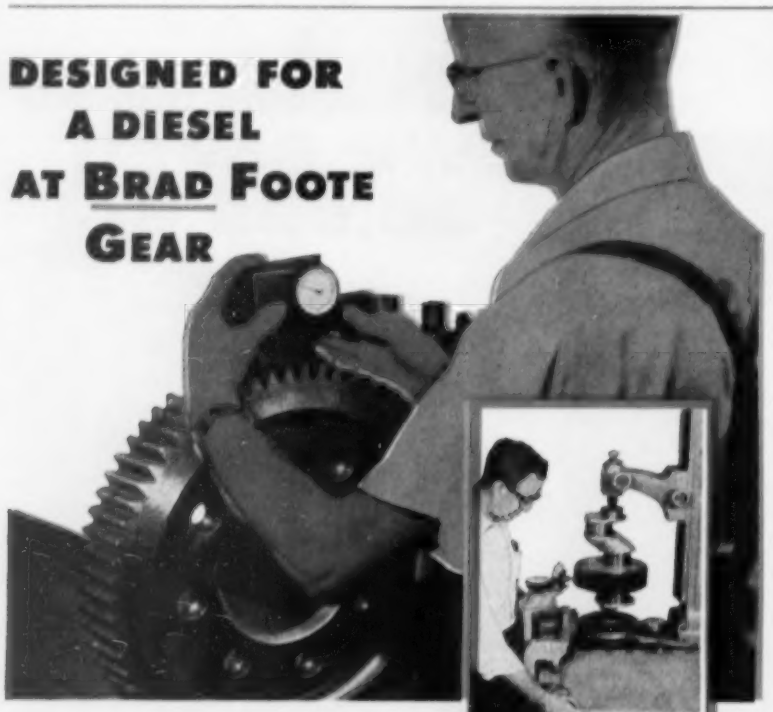
EARLY NEXT YEAR offshore drilling will start in a large section of Southern California's oil fields. The Cunningham-Shell bill went into effect Sept. 7, but it will take some time to process bids for leases and still more time to acquire the equipment needed for over-water drilling. Undeveloped offshore reserves are thought to total at least four billion barrels and other reserves, now being pumped from onshore locations, undoubtedly will be changed to over-water operations.

REPUBLIC STEEL CORP. is buying 11 new diesel locomotives to replace 14 steam units at its Cleveland steel mill. Fifteen diesels already are in use there. It was not revealed what make of locomotives will be obtained . . . A contract "in excess of $11 million" for construction of six Distant Early Warning radar stations in Labrador and Newfoundland has been awarded Johnson, Drake & Piper International Corp. and Merritt-Chapman & Scott. (For background information on the DEW line, see DIESEL PROGRESS for June 1955, pages 40-43.)

RINGSBY TRUCK LINES, Inc., Denver, has applied to the I.C.C. for permission to buy Inland Freight Lines, Salt Lake City, and three other Utah truck properties for $1,450,000. Ringsby's major present route is between Chicago and San Francisco while Inland runs from Salt Lake into the San Francisco Bay Area . . . A. K. Humphries, P.I.E. president, announced his firm is building a Los Angeles freight terminal to cost $1.5 million. He said 500 employees will work there and that preventive maintenance and major overhauls will be effected in the new Los Angeles plant. Recent acquisition of West Coast Fast Freight made the Southern California expansion essential. Engineering facilities for the company will be headquartered in the new facility.

MACK TRUCKS, Inc. has received an order for 40 additional buses from the Ports Authority of Puerto Rico. These are to be 45-passenger diesel buses, worth $750,000. The sale follows a previous order for 50 buses from the same buyer . . . Niagara Frontier Transportation Co. is buying 60 Mack 50-passenger buses to cost about $1,335,000. Power will be Mack Thermodyne diesel engines. This brings to 90 the buses purchased by the Buffalo, N. Y., transit company from Mack in the last year . . . Mack just announced a new model dump truck of 8-yd. capacity to be powered by its 170-hp diesel Thermodyne engine.

FEDERAL-MOGUL'S net sales for the first six months of 1955 were $22,458,607 as compared with $18,576,543 in the corresponding 1954 period . . . Kloeckner-Humboldt-Deutz A.G., Cologne, Germany produced more than 150,000 air-cooled diesels during the last five years, according to Hans Breustedt, vice president, Diesel Energy Corp., New York City . . . Allis-Chalmers is spending $1.8

DESIGNED FOR A DIESEL AT BRAD FOOTE GEAR

BRAD FOOTE MAKES
Spur • Bevel
Helical • Spiral Bevel
Herringbone
Zerol • Worms
Worm Gears
Reducers
Transmissions

•One of the gentlemen above is checking tooth spacing on a gear for Diesel use. The other one is inspecting involute, on a cam shaft gear for another Diesel application.

•Both are old hands at these highly exacting tasks. And well they might be. For these are veterans of BRAD FOOTE'S more than twenty years of experience in providing gears for leading Diesel engine manufacturers. Blower drive gears, crank shaft gears, cam shaft gears, idler gears, governor drive gears—BRAD FOOTE makes them all, and for practically every manufacturer.

•This widespread acceptance of BRAD FOOTE Gears in the Diesel industry is no accident. For BRAD FOOTE brings to this task equipment specially adapted to the requirements of the Diesel industry. And it can apply the specialized talents of a veteran organization experienced in the specific skills required in producing Diesel Gears.

•But we don't rest on our laurels. New equipment for production, inspection and heat treating is added every month. And continuing research places more and more technical "know how" at the disposal of the Diesel industry.

•BRAD FOOTE is very probably making your Diesel engine gears now. If so they are in good hands. If by any chance however we are not, we would like to discuss your requirements or quote on your specifications. Your inquiry will receive prompt service.

BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • OLympic 2-7700 • TWX: CIC-2856-U

subsidiaries

AMERICAN GEAR & MFG. CO.
Phone: Lemont 920
Lemont, Illinois

PITTSBURGH GEAR COMPANY
Phone: SPalding 1-4600
Pittsburgh 23, Pennsylvania

million in Cedar Rapids, Ia., to expand offices and shops where its motor scrapers and dirt wagons are built.

THE FEDERAL POWER COMMISSION recently gave permission to United Gas Pipe Line Co., Shreveport, La., to spend $8,339,481 on 63 miles of line and a new 330-hp compressor station . . . Southern Natural Gas Co., Birmingham, got permission to build 24.7 miles of line to cost $2,020,518 . . . The Association of American Railroads reported net income, after interest and rentals, of the 126 Class I railroads for the first six months of this year at $416 million, compared with $232 million in the same period of 1954. This is a rise of 79%.

DESPITE SEVERAL crippling strikes, truck lines also enjoyed an increase in business, according to the American Trucking Association. The 323 Class I lines (companies grossing $200,000 or more annually) hauled 25,105,254 tons of general commodities during the first six months of 1955 in comparison with 21,988,388 tons in the first half of last year, an increase of 14% . . . As the result of a bill recently signed into law by President Eisenhower, approximately $500 million will be spent on airport construction during the next five years. Federal funds made available for this purpose will amount to about $63 million a year, with states matching these funds, dollar for dollar.

## Cummins-Powered Locomotive

The Standard Slag Company, Steubenville, Ohio, recently purchased a 50-ton diesel-electric locomotive from Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., for use at its slag reclaiming and preparation plant. The locomotive is a special Model S-4300 unit equipped with a 6-cylinder, 300-bhp Cummins diesel engine and will develop a tractive effort of 25,000 pounds at 25% adhesion.

## Flow Indicators

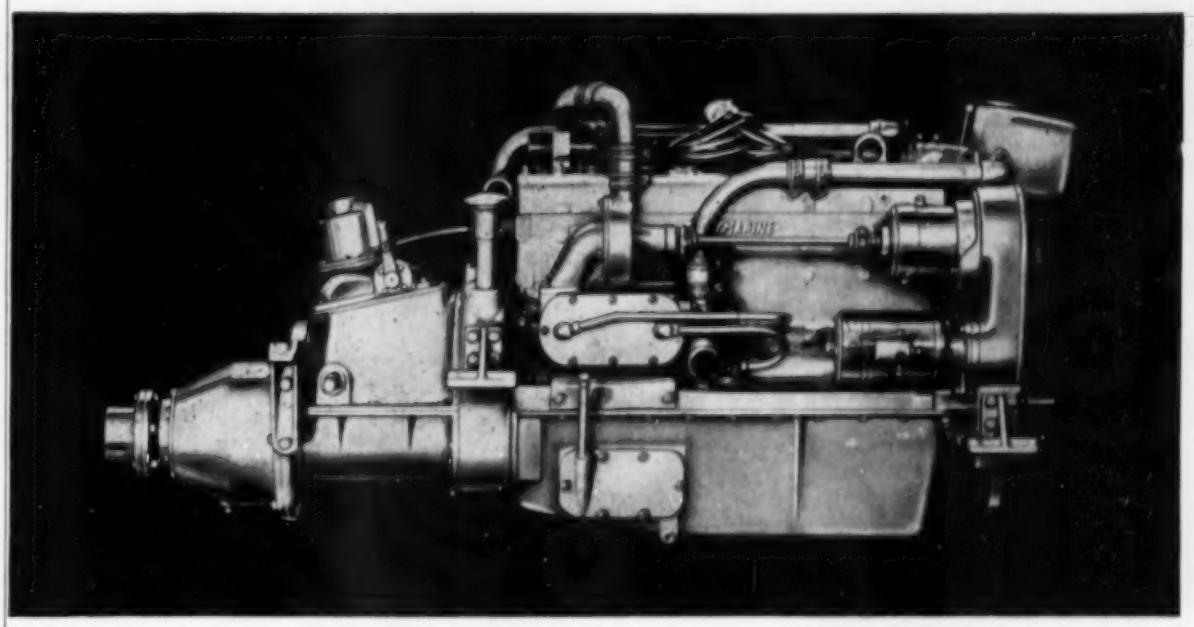
The Gems Company of Newington, Connecticut announces the development of a new product, the Model FI-200 flow indicator which is designed to indicate flow (or lack of flow) of a liquid through a pipe line. The manufacturer states that this instrument is unusually compact and simple, entirely dependable, and easy to install. Flow through the unit actuates a switch that can be used to operate a pilot light, horn or other warning signal. With suitable relays, it can also be used to operate preventive interlocks.

The Gems Company indicates that the flow indicator has many marine and industrial applications. Incorporated in the cooling line of a boat, for example, the indicator will immediately signal flow stoppages such as those often caused by clogged strainers. Applied to non-propulsive engines, such as motor generators, the Flow Indicator could easily be arranged to provide automatic shutdown in the event of coolant flow failure.

Flow indicators now in production accommodate standard pipe sizes from ¼ in. to 3 in. Normally, any flow over 1.5 gallons per minute causes the indicator to function, but other higher or lower points can be provided on special order. Complete information about the flow indicator and other Gems products can be obtained by writing to Mr. Edward Moore, Application Engineer, Gems Company, 64 Welles Drive, Newington, Connecticut. (ITS NEW)

**IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.**

# ROSS EXCHANGERS
## control temperatures in closed cooling systems of Graymarine Engines



Rated 200 hp at 3400 rpm, this Graymarine 427 cu. in. Engine has been designed "for long, trouble-free operation in silty, fresh or salt water."

Big feature of this "Big Six" is its closed fresh water cooling system . . . a system, which on numerous Graymarine engines, includes a Ross Exchanger for dependable temperature control. *Overheating is effectively prevented with a compact, inboard cooler!*

Because of their ability to "take it," rugged Ross Exchangers are regularly preferred for numerous types and makes of sea-going equipment: engines, compressors, boiler feed pumps, turbines, blowers, reduction gears and hydraulic clutches.

Not only do these pre-engineered units provide the dependable thermal efficiency that marine engine and equipment builders must have, but they're readily obtainable. Fully standardized in a wide range of designs and sizes, Ross Exchangers are assembled from mass produced parts and sub-assemblies without costly "specials" in engineering or fabrication.

For detailed information, request Bulletins 2.2K1, 2.1K1 and 1.1K5.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1425 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS
EXCHANGERS

*Serving home and industry:* AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

## Midwest Diesel Notes

*By* **L. H. Houck**

INTERNATIONAL HARVESTER'S industrial power central sales region, embracing 16 central and mid-west states, is now in charge of W. F. Hall, who replaces L. A. Coomer, transferred to the Eastern sales region in another capacity.

ROADBUILDERS EQUIPMENT CO. has opened a new parts store at Union City, Tenn., to supply diesel engine parts, International and Hough parts to users in Tennessee, Kentucky and Missouri.

VANDEVENTER MACHINE WORKS, INC., 1446 Vandeventer Ave., St. Louis, has been appointed distributor for the P. & H. diesel engine. The line includes 2, 3, 4 and 6-cylinder engines, 30 to 255 hp 2-cycle.

GILLIOZ CONSTRUCTION CO., Monett, Mo., has an imposing array of new dieselized Allis-Chalmers equipment on the Fellows Lake Dam project for the Springfield Water Co., involving almost two million yards of excavation. All units have the new A-C diesel. There are six TS-360 motor graders, three AD-40 motor graders, two HD-5's. Chiles Tractor & Machinery Co., Springfield, made the sale.

E. A. MARVIN MACHINERY CO., Springfield, Mo., recently delivered two Universal portable gravel plants powered with 126-hp Caterpillar D-339's.

OLIVER DIESEL CRAWLERS will be handled by B & B Industrial Equipment Co., Mt. Vernon, Ill., in 30 surrounding counties.

A NEW DISTRIBUTOR for Adams roadbuilding equipment made by the Adams Division of LeTourneau-Westinghouse, is Columbus Equipment Co., 50 S. Kingston Ave., Columbus, Ohio.

EUCLID-ARKANSAS, INC., North Little Rock, Ark., has been appointed Arkansas distributor for the full line of diesel compressors of Chicago Pneumatic, as well as drills, parts and rentals.

TO GUARD AGAINST WATER shortages, Springfield Water Co. has put in service as standby equipment two D-337 Caterpillar engines purchased from the E. A. Martin Machinery Co. The engines are direct-connected to centrifugal pumps. One pumps from the river to treatment plant, the other from plant to service mains. They will be used only when other water sources fail.

MARCELINE, MO., has installed a 1400-hp Fairbanks-Morse 7-cylinder 16x20 diesel Model 33F16, direct-connected to a 1000-kw generator.

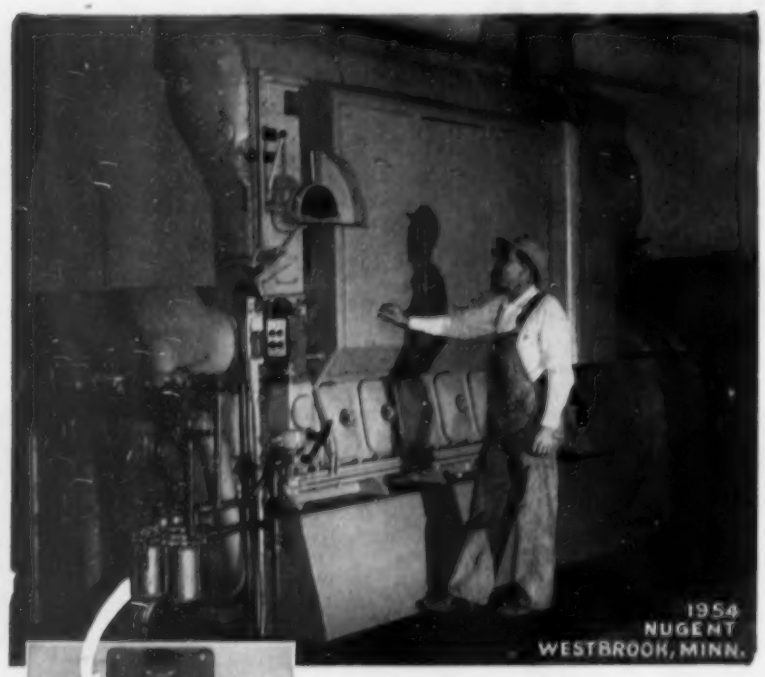
PIGGOTT, ARK., has filed an order with Fairbanks-Morse for a 10-cyl., opposed-piston engine. Delivery is expected this fall.

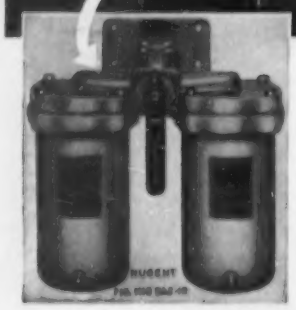
JOHN RIESTERER, Concordia, Mo., farm terrace contractor, recently added two Allis-Chalmers HD-9's with GM-71 engines to his fleet which includes an HD-5 and an AD-40 motor grader. Sedalia branch of Cooke Sales & Service Co. made the sale.

COOKE SALES & SERVICE also recently delivered a HD-9-X dozer to Clarence Blackerby and two HD-9's and an HD-10 with dozers to Herider Construction Co., both of Marshall, Mo. All engines were 71 series GM.

A 3500-HP Fairbanks-Morse dual-fuel, model 31, 10-cylinder 18x27, turning a 2500-kw generator, was recently delivered to the City of Kennett, Mo.

CHILES TRACTOR & MACHINERY CO., Springfield, Mo., has delievered a new Allis-Chalmers HD-21 with torque converter and Allis-Chalmers diesel to Porter-DeWitt Construction Co., Poplar

**NEW**

**Power Plant Diesel protected by Nugent Fuel Oil Filters**

A power plant can't afford "second best" when it comes to diesel fuel oil filters. *That's why* leading diesel manufacturers install Nugent Fuel Oil Filters on nearly every engine slated for power plant service. *That's why* a Nugent Duplex Fuel Oil Filter was included as original equipment on the 960 HP Fairbanks, Morse recently installed for municipal power service at Westbrook, Minnesota.

Nugent Duplex Fuel Oil Filters of this type utilize an inexpensive bag type cartridge that actually removes 99.8% of all solid foreign material from the fuel oil. The cartridge lasts a long time, is easy to replace and presents 20 times more filtering area than any other charge of comparable size. The filter covers, valve manifold and bracket is one casting. Units can be operated separately or in parallel and slow manipulation of the valves will not cause stoppage or high pressure.

You, too, can't afford "second best" when it comes to fuel or lube oil filtering. So, take a tip from leading diesel manufacturers and investigate the possibilities of Nugent Filtering units for your own equipment.

**Wm. W. Nugent & Co., Inc.**
415 N. Hermitage Ave. CHICAGO 22, ILLINOIS

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

***How much*** **of your engine maintenance bill is due to repair of breakdowns that could have been avoided—*if you'd had advance warning?***

At a fraction of that cost, Alnor Exhaust Pyrometers offer you a constant check of engine performance—advance warning of

**Cylinder Overload** **Preignition**
**Scaled Jackets** **Clogged Ports**
**Detonation** **Faulty Injection**

Get the best from your diesel—minimum fuel consumption per horsepower and long service uninterrupted by foreseeable breakdowns. Get constant protection of your engine, cylinder by cylinder, with an Alnor engineered Exhaust Pyrometer System.

***Get Full Information—Quickly!*** Your nearby Alnor Diesel specialist is conveniently listed in the classified directory. Ask him to help you select the Pyrometer and thermocouple assembly designed for your engine. Or send for Bulletin 4361 with complete details of the full Alnor line of Pyrometers.

**ILLINOIS TESTING LABORATORIES, INC.**
Room 508, 420 N. La Salle St.,
Chicago 10, Illinois

Bluff, Mo. It is in use on the $1,800,000 excavating job on U.S. 66, near Hazel Green, Mo,. push-loading Euclid scrapers with 6-71 GM's.

MACHINERY, INC., is a new company distributing Austin-Western equipment, located at 5081 Manchester Ave., St. Louis and headed by Ollie E. Babcock, president, and Ray Masters, vice president, both construction machinery veterans. Austin-Western is a Baldwin-Lima Hamilton subsidiary.

JOHNSON MOTOR LINES, Inc., Charlotte, N.C., has purchased 16 International cab-over-engine trucks with Cummins turbocharged engines, mounted at a 20 degree angle.

DART TRUCK CO., Kansas City, Mo., manufacturers of off-the-highway trucks, announces George F. Dixon, Jr., is newly elected president, succeeding Furber Marshall who becomes chairman of the board. Mr. Marshall is president of Carlisle Corp., Carlisle, Pa., of which Dart is a subsidiary.

HILLSBORO, KANSAS, has begun installation of a Fairbanks-Morse 8-cylinder Model 38D8⅛ opposed-piston engine rated at 1280 hp and turning a 900-kw F-M generator.

MACALLISTER EQUIPMENT CO. is a new equipment company headed by E. C. McAllister, former vice-president and general sales manager of the Patton Tractor & Equipment Co., and H. B. (Herb) Cadmus, vice-president and former Patton executive, at Melrose Park, Ill. They will distribute Link-Belt cranes and other contractor's equipment.

BALDWIN-LIMA-HAMILTON CORP. has been awarded a contract to furnish steel penstock and spillway gates at Table Rock Dam, near Branson, Mo., for $750,000.

## New Export Division

Oakite Products, Inc., manufacturers of specialized industrial cleaning and related materials, have announced the formation of an Export Division to handle the increasing demand from Latin American and overseas companies. Mr. Harry V. Kerker, with Oakite since 1943, has been appointed manager of the new division. Oakite manufactures specialized alkaline, solvent, and acidic detergents for the removal of all types of industrial soils from machinery and from metals in production, as well as conveyor chain lubricants, germicides, metal drawing and burnishing compounds, the Oakite CrysCoat phosphating process, and materials for the treatment of water in air conditioning systems and for use in paint spray booths.

## Manager

Charles A. Wallace has been appointed manager of the Industrial Filtration Division of the United States Hoffman Machinery Corporation, according to announcement by Revis L. Stephenson, vice president. Formerly assistant division manager, Mr. Wallace has been with the company 24 years. He previously had been a machine tool engineer and before that an automotive engineer. He is a graduate of the M.I.T.

## Powers Deep Irrigation Well

A new 8-cylinder Deutz air-cooled diesel engine was installed on the Don Swanson farm in Morefield, Nebraska. This diesel engine, which powers a 430-ft. deep well, making water delivery of 1100 gallons per minute possible, was manufactured by Kloeckner-Humboldt-Deutz A. G. of Cologne, Germany, and imported to this country by Diesel Energy Corporation of New York City. The Deutz air-cooled engine drives an A & C turbine pump, six 12-in. bowls, and has a total head of 325 ft. and a fuel consumption of 6.5 gals. per hour.

County Courthouse, Newkirk, Oklahoma

Where does the Court get its power?

For seven years in Newkirk, Oklahoma, one powerful machine controlled the power of the court...a Fulton 800 H.P. dual-fuel generating unit, lubricated by Cities Service Pacemaker #5 Oil.

But it wasn't only the court that depended upon this one machine . . . the entire town relied upon it. If the machine failed, so might the annual grain harvest, for Newkirk's grain elevators require great quantities of power.

BUT THE FULTON GENERATING UNIT AND CITIES SERVICE LUBRICATION PROVIDED FAULTLESS SERVICE. There was never a breakdown.

Newkirk's power boss, Superintendent of Utilities Ralph E. Cottrell, sums it up this way: "Using Pacemaker #5 in the engine's crankcase and cylinder lubricators, we not only enjoyed trouble-free operation during those seven years, but also surprisingly little wear and oil consumption. Rings, bearings and liners remained in top notch condition and the engine piled up well in excess of 6000 horsepower hours per gallon of oil."

This is but one more powerful story of Cities Service Lubrication . . . a graphic illustration of the kind of results you can expect from these highest quality lubricants. Why not get the whole story from a Cities Service Lubrication Engineer? Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

**Ralph E. Cottrell, Power Boss** of Newkirk, Oklahoma. All of Newkirk depends on him as Supt. of Utilities. He depends on Cities Service Lubricants for town's power generators.

**Powerful Machine Behind The Court** is this Fulton 800 H.P. dual-fuel generating unit. For seven years Newkirk's only major power source, it gave "faultless performance" using Cities Service Lubricants.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

## Vibration Mountings

A new line of heavy-duty general purpose steel spring vibration mountings has been developed by T. R. Finn & Company, Inc., specialists in shock and vibration control. These Finnflex Type SB steel spring vibration mountings are said to combine the superior characteristics of steel springs with unique damping, sway and thrust control elements to achieve a degree of isolation heretofore unattainable in a single mounting.

Type SB Vibration Mountings consist of a cast semi-steel housing containing helical steel springs, rubber thrust bumpers, nylon dampers, and a steel base plate with sway control assemblies. A dual-purpose bolt secures the mounting to the machine and also provides an easy means of leveling. Nylon-lined, pre-compressed, cylindrical rubber bumpers absorb thrust in any horizontal direction. The nylon liners protect the rubber from abrasion and thus assure a constant degree of stiffness. Because of the low-friction characteristics of nylon, an unusually high degree of thrust control is obtained without any undue increase in the vertical stiffness of the unit.

Optimum damping is also provided by the nylon liners which, provided with wear compensating gaps, are pressed snugly around steel studs by the pre-compressed rubber thrust bumpers. All wear is taken up and proper adjustment is maintained automatically. An advantage of this unique design is that built-in adjustable sway control assemblies provide stability without the need for external snubbing devices. The proper degrees of sway control can be set by simple adjustment of the self-locking sway control nuts.

All Finnflex Type SB mountings are available with rubber-bottomed, non-walking baseplates which eliminate "creeping" or "walking" of the equipment and the need to lag the mountings to the floor. The line consists of 41 standard sizes, ranging in rated load capacity from 100 to 6500 pounds, with higher load capacities available. For complete information, write to T. R. Finn & Co., Inc., Industrial Division, Hawthorne, New Jersey. ITS NEW

## Crankshaft Refinishing Machine Tool

A precision machine tool for refinishing diesel crankpins within the engine and without removing the crankshaft is available from Aero-Motive Mfg. Co. of Kalamazoo, Mich. The machine runs on two split adapters that bolt on to crank-cheeks. The machine itself is also built in halves, one half carrying the cutting bits and the other half carrying the honing stones. Accuracies of less than .001 in roundness and finishes of 32 micro inches are said to be quickly and easily obtained. The machine is available in five sizes for crank pin diameters of 4 in. to 20 in. ITS NEW

## Affiliate Takes Over

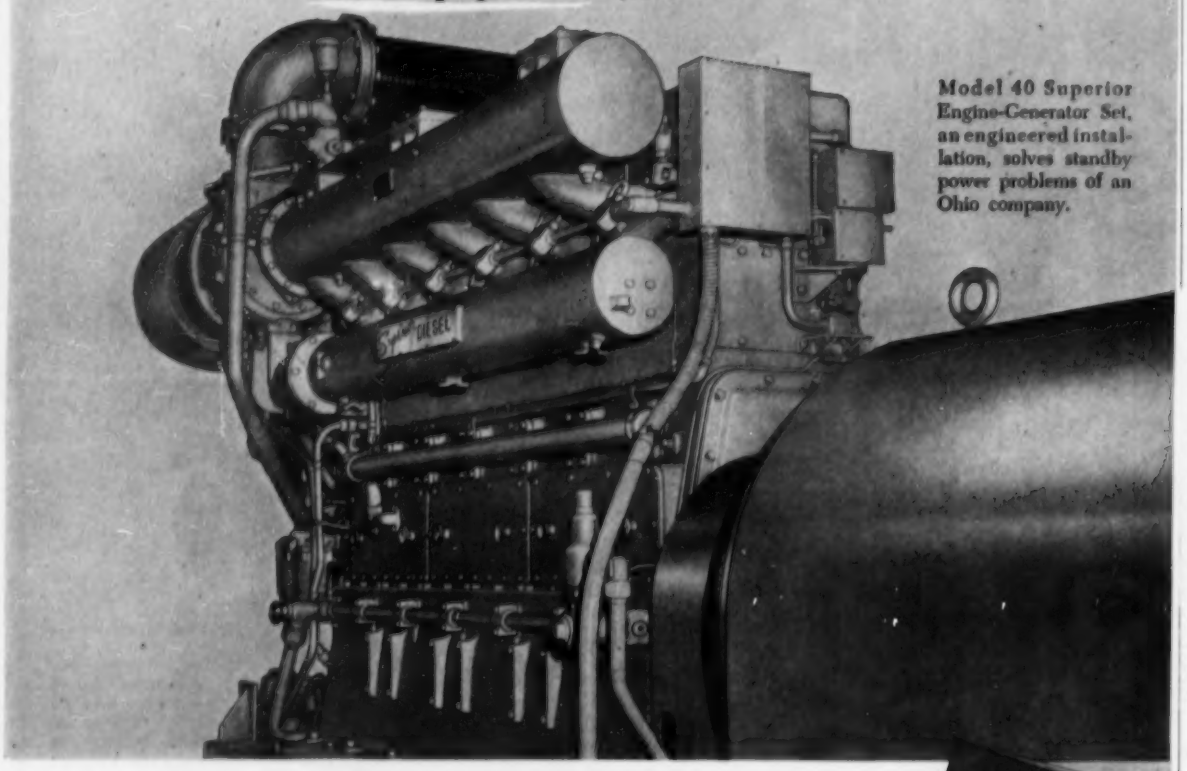
The U. S. Hoffman Machinery Corporation, Industrial Filtration Division, has announced the transfer of manufacture and sales of its bypass, fullflow and portable cartridge filters, oil conditioners, vaporizers and preheaters to its affiliate, the Hoffman-Allen Corporation of Springfield, Mo. Under this arrangement, product design and sales policies will remain unchanged.

U. S. Hoffman will continue to manufacture flotation systems, magnetic separators, and other products for the metal-working field at its Thompson Road plant in Syracuse, N. Y. The Hoffman-Allen Corporation, through its affiliate, the Filter and Injector Company, Springfield, Mo., will continue to make and furnish filter cartridges and supplies for the Hoffman filter and other similar filters.

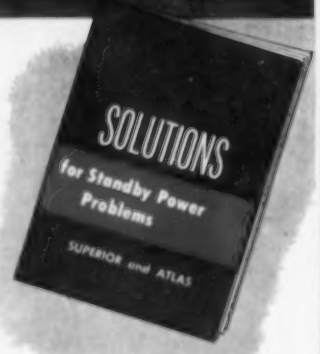

see how

Superior or Atlas Engines

solve your standby power problems



Model 40 Superior Engine-Generator Set, an engineered installation, solves standby power problems of an Ohio company.




Engineered installations of Superior and Atlas Diesel, dual fuel and gas engine-generator sets have solved hundreds of standby power problems! In many cases they've paid for themselves. Their automatic start and stop operation often averts tragic consequences, by providing efficient, dependable power for essential plant services in every instance of main power source failures. In order for you to have all the facts and figures we've prepared a special case history file. It shows many instances of how our skilled engineers assisted in solving serious problems involving special considerations and peculiarities in individual installations. Chances are many of the installations will be similar to yours. This information will prove a valuable aid in your planning.

Write, on your letterhead, requesting this file of helpful examples. White's skilled engineers, with years of experience in developing engineered installations of Superior or Atlas engine-generator sets, will assist you in engineering the proper standby power for your specific requirements.

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY • *Plant and General Offices: Springfield, Ohio*

Superior ENGINES ATLAS DIESEL ENGINES White DIESEL

## Electric Heating Bulletin

Executives and engineers of plants in which oils or process liquids are heated will be particularly interested in a new bulletin on electric heating equipment for these services which has just been prepared by Hynes Electric Heating Division of Turbine Equipment Co.

The new bulletin concisely and graphically explains the distinctive features of design and points out the many services to which these heaters can be advantageously applied. The illustrations include exterior and skeletonized views and constituent elements of the heaters, and typical flow diagrams showing their application to a hot oil system for jacketed vessels and for an asphalt plant.

Complete specifications of materials and operating ranges are also included, together with detailed comparisons of the units with other methods of heating such as direct fired and steam. Copies of the bulletin can be obtained by addressing Hynes Electric Heating Division, Mountainside, New Jersey, and asking for Bulletin 102.1. ITS NEW

## Caterpillar Booklet

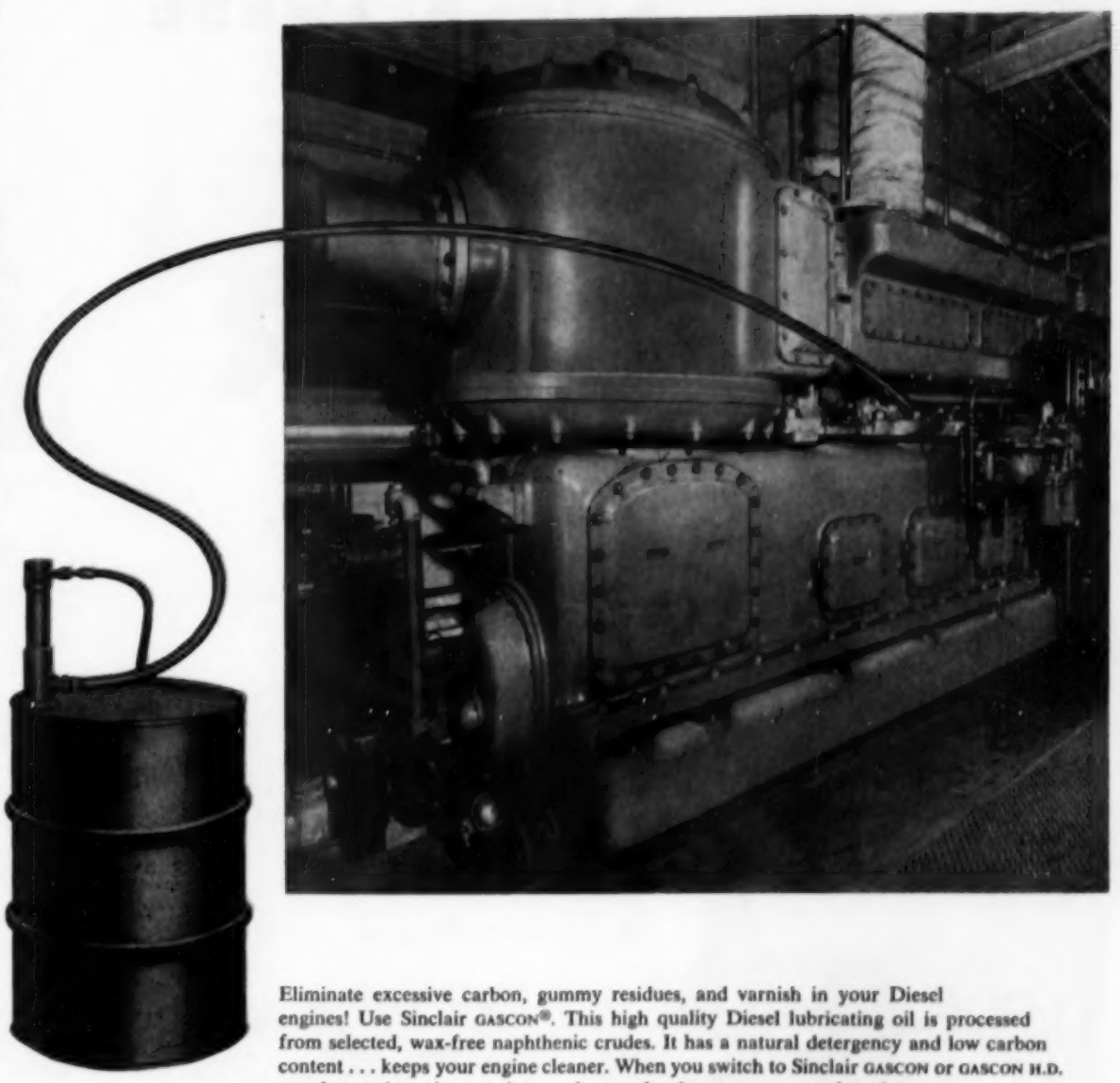
Temperatures in modern diesel engines often reach 3600°, leading to heat prostration in vital parts. "Danger in the Heat Zone," a new booklet recently published by Caterpillar Tractor Co., discusses how this can be avoided through sound metallurgy and careful machining. In eight illustrated pages this booklet describes the design, processing to specifications, machining to close tolerances, and rigid inspections required to insure long engine life. These are the factors contributing to the dependability of Cat Engines. Copies of this booklet, form DE582, may be obtained from any Caterpillar dealer or by writing Caterpillar Tractor Co., Peoria, Ill. It is also available in French, Spanish and Portuguese. ITS NEW

## Compressor for Air Drilling

A line of heavy-duty compressors for use in air drilling of oil and gas wells has been announced by Stanley E. Johnson, vice president, Cooper-Bessemer Corp. Delivering up to 1500 psi air pressure, the new compressor can be operated from existing drilling unit draw works or powered by individual engine prime movers, according to Mr. Johnson. There is an increasing trend to the use of air for drilling wells, explains Mr. Johnson. Often compressed air is used as an alternate to mud for cooling the drill bit and clearing rock chips. Because of various formations found in drilling a single well, contractors are finding it advantageous to be able to use either air or mud, or a combination of air and mud to speed their operations. Cooper-Bessemer's air drilling compressor is a package unit mounted on skids. It can be moved around easily with the contractor's drill equipment. A V-belt pulley is used to drive the unit from the conventional draw works power take offs. Such take-offs generally furnish up to 1500 hp which is used only when pulling the drill string. As a result, there is always ample power available for driving the air compressor during the actual drilling, Mr. Johnson points out.

For normal drilling requirements, approximately 2000 cu. ft. of air per minute are sufficient at 250 psi. Clearing clogged bits or blowing water slugged holes calls for pressures up to 1000 psi. With exploration for gas and oil going deeper and deeper, Cooper-Bessemer foresees accelerated use of air in drilling. This is because compressed air eliminates many of the problems of heavy water columns creating extremely high pressures on drill bits and rock formations. Under such conditions, drilling characteristics of certain rock formations become more and more difficult to handle. ITS NEW


# Check Carbon!



Eliminate excessive carbon, gummy residues, and varnish in your Diesel engines! Use Sinclair GASCON®. This high quality Diesel lubricating oil is processed from selected, wax-free naphthenic crudes. It has a natural detergency and low carbon content . . . keeps your engine cleaner. When you switch to Sinclair GASCON or GASCON H.D. you know that pistons, rings, valves and exhaust ports stay free from carbon, gums and varnish.

No matter what design of engine you're operating, you'll be 'way ahead with Sinclair's complete line of Diesel lubricants. Contact your local Sinclair Representative now for full details, or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N.Y.

SINCLAIR GASCON OILS

### Folder Describes Centrifugal Tachometers

A new, 4-page folder describing the simplified operation and ease of installation of its new stationary centrifugal tachometers, has been released by the manufacturer, Boulin Instrument Corporation, 65 Madison Ave., New York City. The folder explains and illustrates how the design components of its tachometer are easily adaptable for quick installation on any type of plant operating equipment such as motors, conveyors, machines, turbines, shafting and specialized equipment—to check and show proper speeds for maintaining optimum performance.

Featured is a series of engineering drawings illustrating the interchangeable components such as tachometer heads, different type drive sections, pinion bracket assemblies, and split gear drives, together with specification details for individual user requirements. Folder suggests many applications for in-process speed control where absolute uniformity of processing or constant operating efficiency is demanded and must be set in revolutions, feet or yards per minute, or in any units of production. (ITS NEW)

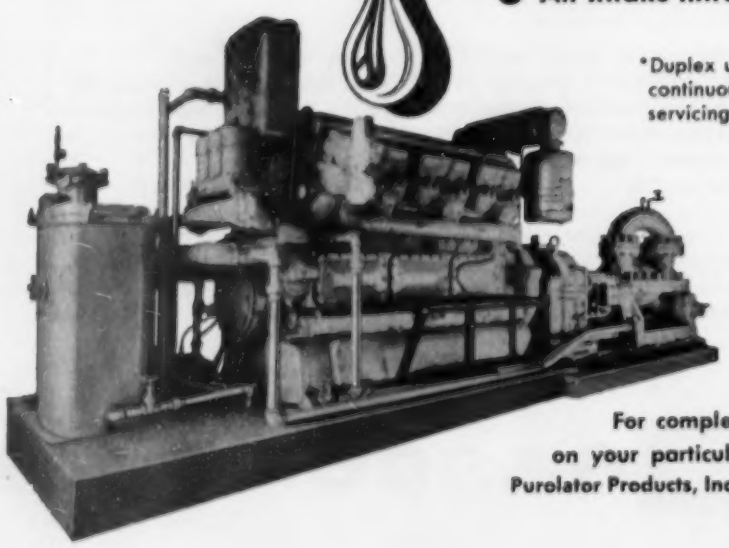

*For positive filter protection . . .*

**CHECK THESE 5 POINTS WITH PUROLATOR**

*"FIRST in the field of filtering"*

- **Full flow lubricant filtration**
- **Micronic filtration of fuel to the injector pump ***
- **Individual filter protection for each nozzle**
- **Metal edge filter to protect fuel transfer pump ***
- **Air intake filtration**

*Duplex units available for continuous operation while servicing filter elements.



**For complete technical filter data on your particular diesel application, write to Purolator Products, Inc., Dept. DL1-1010, Rahway, New Jersey.**


### Rugged Duty Generator Sets

Stewart & Stevenson-designed diesel generator sets are sitting on top of the world —70 miles above the Arctic Circle where they operate in average temperatures of —70°. The sets supply power for important TACAN electronic (radar) units which are in isolated locations. These sets have remained in 24-hour-a-day operation for as long as ten days without human attention. Other units of these versatile generator sets are operating in the tropical areas of the South Pacific where temperatures reach an average of +130°.

Stewart & Stevenson Services has been a pioneer in the manufacture of generator sets tested to operate in the most extreme temperatures. At the company's headquarters in Houston, sets are tested in a specially designed cold room where temperatures can be lowered to —90°. The sets are tested for quick starting and for dependable, trouble-free operation at these temperature extremes. Thousands of these generator sets have been built especially for the use of the United States Armed Forces. They are being used on electronic equipment manufactured by General Electric, Bendix, Craig Machines, and by many of the major oil companies.

### Fuel Conditioner

Petroleum Solvents Corp. announces a new quart-size can of Siloo Diesel Fuel Conditioner. Previously available in gallon cans and drums, the new quart-size can makes it convenient to use the product in diesel tractors, trucks and buses. The product, added to diesel fuel, keeps injectors clean; aids in proper and complete combustion and eliminates hard starting, pounding and excessive smoking, according to the manufacturer. Literature is available by writing the manufacturer at 331 Madison Avenue, New York 17, N.Y.

### Joins Kewanee-Ross

John A. Jost has joined Kewanee-Ross Corporation (Ross Heater Division), Buffalo, N.Y., as heat exchanger development engineer, after 18 years with Foster-Wheeler Corporation where he specialized in Karbate heat exchangers.

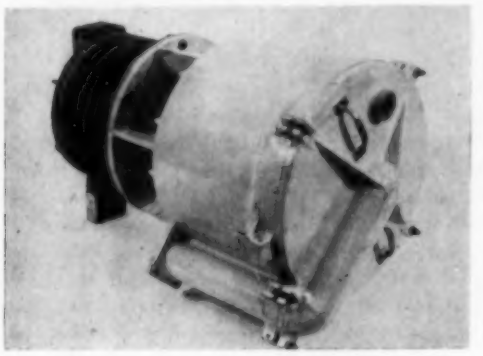

**IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.**

## Named to ASME Committee

Dwight M. McMakin

Dwight M. McMakin, assistant manager of the engine and compressor department, American Air Filter Company, Inc., has been appointed an "Associate" of the executive committee of the Oil and Gas Power Division of the ASME (American Society of Mechanical Engineers). He has long been identified with the use of air filters with engine and compressor operations. Mr. McMakin will be the only representative of the air filter industry on the committee. He is a graduate of the University of Kentucky.

## The GM Oil Seprifuge



A new centrifugal-type, full-flow lubricating oil cleaning device that was designed to eliminate the need for filters on diesel locomotives has been developed by Electro-Motive Division of General Motors. Called the "Seprifuge," it became available as an accessory on EMD locomotives with ac current equipped diesel locomotives and will be sold for this purpose by Electro-Motive.

"At engine idling speed, the Sepifuge cleans oil at the rate of 80 gpm, its rotor spinning at the rate of 1140 rpm," N. C. Dezendorf, EMD general manager, explained. "At full engine speed, the rotor spins at 3245 rpm and cleans oil at the rate of 265 gpm. In other words, all oil delivered to the engine is cleaned by the Seprifuge regardless of engine speed. Impurities, which cause engine wear, are whirled out of the oil at tremendous force (2100 times the force of gravity) and collected in dirt chambers surrounding the motor."

**Components of new Seprifuge—centrifugal type lube oil cleaning unit developed by Electro-Motive Division of General Motors—shown, from left, cover, rotor shell, impeller, housing, and 5 horsepower ac motor. Entire unit, complete with motor, is only 40 inches long with a diameter of 24 inches, same diameter as the filter unit it replaces but six inches shorter in length.**

Tests on locomotive engines show that the Seprifuge has run for two months without the necessity for cleaning, whereas the filters it replaces need to be changed on the average of every 15 days. Not only are the cost of filter elements saved, but the filter disposal problem also is eliminated. Length of the Seprifuge is 40 in. and diameter 24 in., so that it fits easily into the plumbing rack of the locomotive. Power is supplied by a 5-hp ac motor. While this limits application to ac equipped locomotive units, a turbine-powered Seprifuge, deriving its power from the lube oil scavenging pump, is being developed that will be applicable to all locomotives, Mr. Dezendorf said.

Operation of the Seprifuge is basically simple and the device is easy to maintain. Oil to be cleaned is pumped under pressure into an inlet at one end of the device where the oil is channeled into 12 compartments in the spinning rotor. Centrifugal forces separates heavier-than-oil dirt particles, forcing them to the outside of the impeller. All abrasive particles larger than the minimum oil film thickness which lubricates moving engine parts, pass through slots in the side wall of the impeller and into the dirt collection chambers. Dirt so collected remains in the chambers because of combination with resins that result from the natural breakdown of the oil during operation. Together, they form a tarry sludge which sticks to the inside of the chambers even when the Seprifuge is not running. Thus there is no danger of contamination of the cleaned lube oil. Additives are not removed in the cleaning process because they have very nearly the same gravity as the oil itself. Cleaning of the Seprifuge is accomplished by a simple, rotor-type cleaner specially designed for the purpose. (ITS NEW)

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1875 KVA 1500 KW 300 RPM
3 phase 60 cycle 2400 volt
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## European Diesel News

*By* Leo Walter

MESSRS. J. and H. McLaren, Ltd., Leeds, announce a new diesel type for particular use in earth-moving equipment. Prototype models are on test in two sizes — four and six-cylinder units. Known as the EL-range, they have a bore of 5⅝ in. and 6 in., respectively, and (at 1800 rpm) the ratings are 120 and 180 bhp. By addition of a supercharger, it is claimed that power output can be increased 30%. It is probable that for traction purposes the maximum speed will be raised to 2200 rpm. Overall dimensions of the six-cylinder LE6 are 72¾ in. long; 35¼ in. wide; 44 in. high. Weight is about 3200 pounds. The four-cylinder LE4 is 16 in. shorter and weighs 2400 lbs.

More than 20 makers of British diesel engines were represented at the Engineering, Marine and Welding Exhibition in London during September. Also, many manufacturers of auxiliary equipment for oil engines exhibited their products. Among the exhibitors were: A.E.C. Ltd., Southall, Middlesex; Ailsa Craig, Ltd., Ashford, Kent; Allen, W. H. Sons & Co., Ltd., Bedford; Associated British Engineering, Ltd., London; British Polar Engines, Ltd., Govan, Glasgow; Brush Group, Ltd., London; Coventry Climax Engines, Ltd., Coventry; Crossley Brothers, Ltd., Openshaw, Manchester; Davey, Paxman & Co., Ltd., Colchester; Dorman, W. H. & Co., Ltd., Stafford; English Electric Co., Ltd. (Diesel Engine Div.), London; Gleniifer Engines, Ltd., Glasgow; Harland & Wolff, Ltd., London; Lister, R. A. (Marine Sales), Ltd., Dursley, Glos.; National Gas & Oil Engine Co., Ltd., Ashton-under-Lyne; Pelapone Engines, Ltd., Derby; Perkins, F., Ltd., Peterborough; Richardsons, Wesgarth & Co., Ltd., Wallsend-on-Tyne; Russell Newbery & Co., Ltd., Dagenham, Essex; Ruston & Hornsby, Ltd., Lincoln; Tangyes, Ltd., Birmingham; Thornycroft, John I. & Co., Ltd., London.

A GROUP of interesting vessels for estuary service is coming in service for Messrs. Shell Mex and B. P., Ltd. Nine shallow-draught tankers fitted with Blacktone engines will distribute petroleum products from the Shell Co.'s refineries near London to various river depots in coastal areas. The first tanker was launched by Messrs. James Pollock Sons & Co., Ltd., from their Faversham shipyard in mid-1955. The vessel was named *B. P. Haulier*. The main engine is a Lister six-cylinder type rated to develop 270 bhp at 600 rpm.

DIESEL manufacturers on the European Continent give increasing attention to noise created from air intake. Fig. 1 illustrates a new mushroom type of air intake silencer, built by M.A.N., Augsburg. Fig. 2 is a type built by Sulzer of Winterthur, Switzerland using multi-nozzles. By splitting the incoming air stream into numerous small-bore channels, noise is reduced. The Venturi shape of the nozzles allows recovery of pressure drop. It is claimed that turbocharging noise is thus avoided.

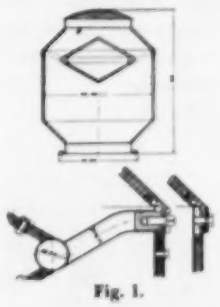


Fig. 1.

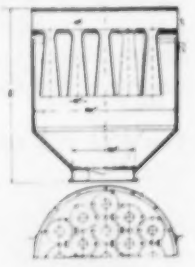
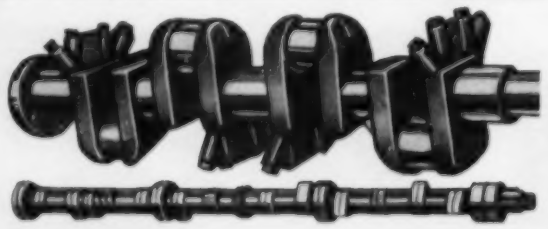


Fig. 2.

MESSRS. Linke-Hoffmann Bush A.G., Watenstedt, Germany, delivered at the end of 1954 the last diesel-driven railway train for Mexico. Maybach diesel engines, type MD 320, were used; Six-cylinder type, 450 Ps at 1700 rpm., dry weight about 5700 pounds. Maybach-Mekydro gears were used for a maximum torque of 650 PS. A change-over mechanism is incorporated in the Meykdro housing for changing direction of traction. Special batteries of the type Mareg are used for starting the engines. Daimler-Benz diesels are used for auxiliary purposes, having 90 Ps each at 2800 rpm, and drive A.V. generators, supplied by Brown-Boveri Co. A. G. of Mannheim.

A NEW horizontal diesel engine has been released by Henry Meadows, Ltd., Wolverhampton. The normally aspirated engine produces 165 bhp at 1800 rpm. When turbocharged, it provides 240 bhp. It is rated for 12 hours continuous operation. Having direct injection, with all auxiliaries minted on one side, its low overall height is claimed to allow for additional passenger and freight space.

NORTH BRITISH Locomotive Co., Glasgow, announce manufacture under license from M.A.N. of a range of diesel engines for locomotive marine

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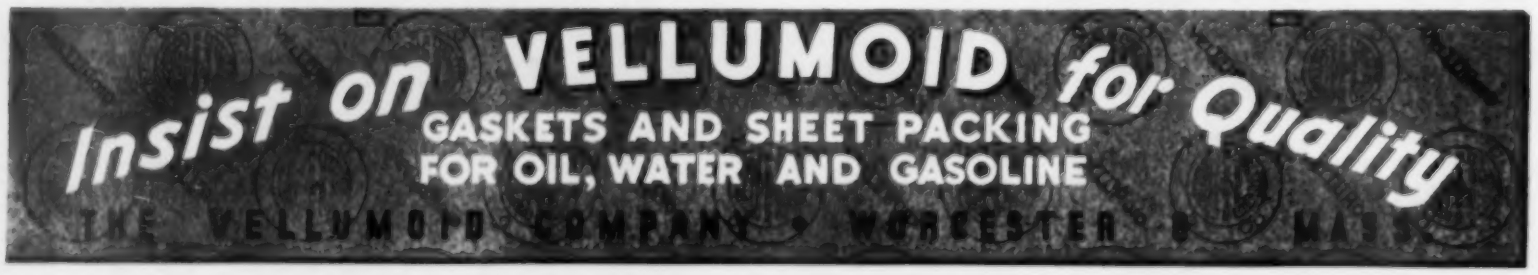
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auxiliary, and other auxiliary purposes. Under the trade name of "Scots M.A.N.," the following types are available: L12-V, 18/21B, as a lightweight locomotive engine of 1000 bhp, supercharged at 1500 rpm, W8-V22/30A loco and marine type, supercharged 950 bhp at 900 rpm.—W8-V 17.5/22A for general purposes yielding 440 bhp supercharged at 1000 rpm.

THE FISHING vessel *Sir William Hardy* is claimed to be the first British-built diesel-electric trawler. Built by Hall, Russell & Co., Aberdeen, the vessel employs four 200 bhp Meadows main diesel engines. The vessel is 131 ft. long with 27-ft. beam. The trawler is now carrying out research work on the preparation of fish as food in its specially equipped laboratory. Four scientists can be accommodated in addition to a crew of 16.

MESSRS. Dowty Fuel Systems, Ltd., of Cheltenham, Gloucestershire, England have developed highly efficient spill flow burners, as shown in sectional view in Fig. 3. It is claimed that simplicity in design, the incorporation of large holes, and of other dirt eliminating design characteristics make the Dowty spill flow burners reliable for use in simple fuel systems unhampered by elaborate filtration, fuel pre-heating of high system pressures.

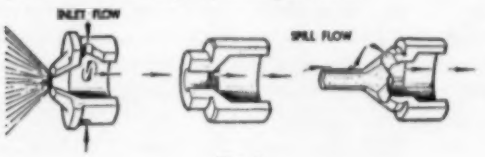


**Fig. 3.**

F. Perkins, Ltd., Peterborough, received an initial order for 1000 diesel engines to be incorporated into a new Australian-built four-wheel tractor.

## New Cooper-Bessemer President

**Lawrence F. Williams**

Lawrence F. Williams has been elected president of The Cooper-Bessemer Corp. by its Board of Directors at a recent meeting in Mount Vernon, Ohio. By his election, Mr. Williams succeeds Gordon Lefebvre who had previously requested the Board consider his resignation because of health. Accepting Mr. Lefebvre's resignation with regret, the directors expressed their appreciation for Mr. Lefebvre's 14 years of successful administration. James E. Brown, treasurer of Cooper-Bessemer, was elected to serve also as secretary of the company, replacing Mr. Williams.

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**Aircooled and Watercooled**
**2½ to 48 hp diesels for every industrial and marine need**

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Petter diesels are backed by a worldwide Parts and Service organization for the 400,000 engines in use.

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**WHEREVER THERE IS A TUG, YOU WILL GENERALLY FIND BRIGGS FILTERS—THE "CHARLIE S" IS ANOTHER BRIGGS EQUIPPED, HIGH PERFORMANCE TUG BOAT**

Built by DAVIE Shipbuilding, Ltd.
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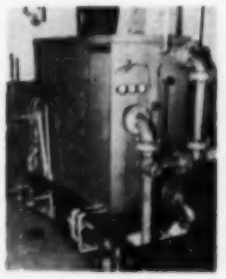

Showing a Briggs CD type filter on their 12 cylinder 2 cycle diesel engine, rated 1200 S. hp. at 750 engine rpm.

"Charlie S"—new 94'4" Quebec harbor tug built and operated by Davie Shipbuilding, Ltd.

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## Florida Diesel News

*By* Ed Dennis

THE *Gisela*, an 83-ft. trawler designed and built by C. J. Holtz of Atlantic Beach, the first GM 6-71 tandem diesel marine engine, model 12008-C to be installed in a fishing vessel in Florida. A GM power transfer gear 5 to 1 by Falk Corp. was included in the installation.

TEN CUMMINS diesel models NHB 600 in Mack hi-way tractors, for Minute Maid Orange Juice of Plymouth.

AT ST. AUGUSTINE, the Diesel Engine Sales launched the 60x18 ft. *Silver Sands* for Albert King of Gulf Shores, Alabama. GM power take-off, Jabsco and Marine Products bilge pumps and a General Motors 6-71 diesel engine.

SOUTHERN DIESEL SALES, Ft. Myers, replaced a gas engine with a GM 4-51 diesel on the party boat *Helvetia* for Capt. Pond of Naples.

FOR THE Haytian Tractor & Equipment Co. of St. Marc, Haiti; two D4 Caterpillar tractors and a #12 road grader.

AT TAMPA, J. Matassini & Sons Fish Co. took delivery of a 3-cylinder model 49A1½ Fairbanks-Morse marine diesel.

SOUTHERN FRUIT Distributors of Orlando received an Autocar powered with a HRFB 600 Cummins and 200-hp NHB-600 Cummins went to H. Cone of Tampa in a Mack trailer.

FOUR SUPERIOR DIESEL GENERATING units, each rated 1000 kw, is expected at the Stark Power plant.

BUILT AT Pensacola by its owner, Herman Boda, the recently launched *Georgiana* is powered with a Caterpillar D13000 and Snow-Nabstedt 3:1 rkr gears, to trawl for croakers for the Sanders Cat Food plant.

CUMMINS DIESEL ENGINES of Florida powered the yacht *Ginger* with two 150-hp Cummins diesels; Capital hydraulic 2:1 rkr gears, owned by David Scholze of Daytona Beach.

AUTO MARINE Engineers of Miami has been appointed the Petter Marine Distributors for the Petter marine diesel engines for South Florida.

AT KEY WEST Shelley Tractor & Equipment Co. repowered the trawler *Peace II* with a Caterpillar D318 diesel 3:1 rkr gears; for Hyman Hopkins of Marathon Seafoods.

FLORIDA DIESEL Engine Sales at Miami supplied the two General Motors diesels series 4-71 model 4087-88 with 1.5:1 rkr gears for A. M. Chakarian of the yacht *Chick*.

FLORIDA GEORGIA Tractor Co. delivered to Perrine Construction Co. a Northwest dragline with a Murphy diesel rated 150 max. hp at 1800 rpm for Murphy 21 diesel to Playland Island Corp. of Hollywood, Florida.

LEE TIDEWATER Cypress Lumber Co. had a model HBI 600 Cummins diesel rated 150 max. hp at 188 rpm for use in a 25-ton GE locomotive at Perry.

GENERAL ENGINE & Equipment Co. of Tampa replaced two gasoline engines on the 45-ft. yacht *Chevron* with 2 General Motors 4-71 inclined diesels, 1.5:1 rkr gears owned by K. W. Foster of Clearwater.


Crofton Watermaker

Water . . . as fresh as from a mountain spring . . . up to 160 gallons of it a day . . . can be made on your boat by a CROFTON WATERMAKER. Utilizing waste heat from your engine exhaust, this simple, automatic WATERMAKER is easily installed and maintained.
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EFFICIENT
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Utilizing only the exhaust heat of your engine, this efficient little unit will make cool, sweet drinking water from salt, brackish or any other non-potable water. Applicable to any main or auxiliary engine of 50 to 600 hp, it also cools and quiets the exhaust. Now offered to the marine industry for the first time, the CROFTON WATERMAKER is producing pure, sweet-tasting drinking water on government vessels, fishing boats, towboats and cruising yachts . . . day after day.

*Send for Complete Information.*

CROFTON CO. "G" St. Pier San Diego, Calif.


### New Mechanical Sound Detector

A new, improved listening device makes it possible to detect the smallest internal defects in moving machinery without shutting down or otherwise taking the equipment out of service. Named the Engineer's Sound Detector, the device amplifies normally inaudible defect-caused noises and allows the user to accurately locate broken, loose, worn or bent parts in reciprocating engines, motors, gear boxes, compressors, pumps and similar equipment, regardless of size. It is also extremely useful in determining the efficiency of steam traps and locating air or liquid leaks in underground piping, normally hard to find.

Resembling a doctor's stethoscope in design, the Engineer's Sound Detector utilizes dual detectors to transmit sounds to one or both ears as desired. Each detector contains both a pick-up diaphragm and an amplifying diaphragm to provide maximum sound vibrations. When used on any type of engine, the extreme sensitivity of the Engineer's Sound Detector enables the user to correctly diagnose sounds caused by scored cylinders, bent shafts, worn bearings, excessive end play or lack of lubrication. Worn brushes, foreign matter, pitted shafts or bearings can easily be distinguished in electric motors, as can stuck or leaking valves in compressors and pumps.

The detector may be put together or disassembled in a matter of seconds and the entire assembly fits neatly into a handsome case. For further information write George Burke, Burke & Co., Worton, Maryland. (ITS NEW)

### Nordberg Distributor

Appointment of Lively Equipment Company, Albuquerque, New Mexico, and their affiliate, Lively Equipment Company, El Paso, Texas as distributor for Nordberg Power Chief diesel engines in New Mexico, the El Paso area and northeastern Arizona has been announced by the Nordberg Manufacturing Company, Milwaukee 1, Wisconsin.

The Lively Equipment Company was organized 10 years ago by its president, W. E. Lively, Jr. Operations began in a small building with only 120 sq. ft. of floor space and today the company has approximately 15,000 sq. ft. of floor space at the Albuquerque location and 5,000 sq. ft. at El Paso, Texas, The El Paso store is operated by Robert Mackey, who is also a vice president of the company. Mr. D. Orton Smith serves as secretary-treasurer.

### Literature On New Casting Process

Lebanon Steel Foundry announces publication of a sales bulletin on Ceramicast (R), a new casting process. Ceramicast (R) utilizes ceramic molds to produce castings with the following advantages: Smooth surfaces, with surface variations held to a maximum of 125 micro-inches; intricate shape, of complex casting design and detail; thin metal sections, where thicknesses of 1/16 of an inch and less are desired; close tolerances, from .003 to .005 inches per inch; reduced machining costs. The process reduces or eliminates machining; lower production costs, jobbing wood or metal patterns may be used, with short lead time assured; adaptable to almost any casting size or alloy.

Request Ceramicast (R) bulletin from John H. Boyd, general sales manager, Lebanon Steel Foundry, 79 Lehman Street, Lebanon, Penna. (ITS NEW)

## Executive Engineer

Captain Max Schreiner

Elliott Company, Jeannette, Pennsylvania, announces the appointment of Captain Max Schreiner (USN retired) as executive engineer. In this capacity, he is responsible for all engineering of the company's turbine, compressor, supercharger, and general apparatus division. Captain Schreiner was formerly commanding officer and director of the U.S. Naval Boiler and Turbine Laboratory, in Philadelphia. He is a graduate of the U.S. Naval Academy and received his master's degree in engineering from Columbia University. During his naval career, Captain Schreiner has been intimately connected with the design, operation, and maintenance of steam propulsion equipment.

## Another Florida Cargo Vessel

The deep faith which one of the world's richest men holds in Florida's future is giving Miami shipping circles a big lift. Already the largest individual investor in the State's history, Arthur V. Davis, board chairman of the Aluminum Corp. of America, has added a string of small cargo vessels to his holdings in Florida.

The Three Bays Line is a natural link between his some 20 successful business enterprises in Florida and the West Indies. The newest vessel, *Jacks Bay*, with a capacity of 30,000 cu. ft. of refrigerated space for frozen produce, has a speed of 14 knots. For power, the 180-ft. cargo vessel has two 12-cylinder General Motors Model 567-A diesel engines each rated at 900 hp with Falk 2.5:1 reverse and reduction gears; one 75 kw Caterpillar and two 45 kw Caterpillar diesel generating units are used for auxiliary purposes. Monsell W. Darville is captain and George Anderson is the chief engineer.

## Dedicates California Plant

A new, ultra-modern manufacturing and distribution center was dedicated at Sunnyvale, Calif., August 31 by the R. M. Hollingshead Corp. The company manufactures maintenance chemicals with a main plant in Camden, N.J. The West Coast plant was placed in operation by California's governor, Goodwin J. Knight, following addresses by R. M. Hollingshead, Jr., Chairman of the Board, and by R. M. Hollingshead, III, General Manager of West Coast operations.

Tilt-up type construction was used in the new plant which covers an area of 60,000 sq. ft. Mixing facilities in the plant include 14 tanks with a total capacity of 39,300 gallons. John S. Bolles designed and Hilp & Rhodes built the Sunnyvale plant. Both are from San Francisco, only 38 miles to the north. This location makes it possible for the company to serve customers in the 10 western states more swiftly and economically, according to General Manager Hollingshead.

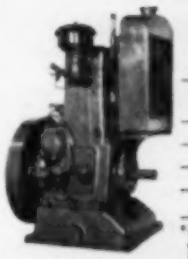
## Named General Sales Manager

R. D. Friedlander

R. D. Freidlander has been appointed general sales manager of the Diesel Energy Corporation, 82 Beaver Street, New York City, it was announced recently by Maximilian B. Bauer, vice president and chief executive officer. Mr. Friedlander will be in charge of U.S. sales for all products of Kloeckner-Humboldt-Deutz A.G., Cologne, Germany, which are imported by the Diesel Energy Corporation. He will also be responsible for the existing distributor and dealer organizations as well as the further development of same.

A native of Cologne, Mr. Friedlander has worked as manager for various machinery and diesel engine manufacturers in Europe and in the United States. He has been with the Diesel Energy Corporation for a number of years.


WITTE Small Diesels



MODEL "ADRS"

WITTE VERTICAL ENGINES

| MODELS | CONT. H.P. | COOLING | MAX. RPM |
|---|---|---|---|
| "ADTS" | 7.0 | Tank | 1200 |
| "ADRS" | 3.75* | Radiator | 1200 |
| "LDTS" | 9 | Tank | 1350 |
| "LDRS" | 8.6* | Radiator | 1350 |

*Lower rating due to power required to operate fan. Units can be equipped with stub shaft or clutch power take-off.

WITTE HORIZONTAL ENGINES

| MODELS | CONT. H.P. | COOLING | MAX. RPM |
|---|---|---|---|
| "BDTS" | 8 | Tank | 900 |
| "BDRC" | 7.8* | Condenser | 900 |
| "CDTS" | 12.5 | Tank | 750 |
| "CDRS" | 12.2* | Condenser | 750 |

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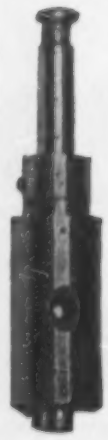

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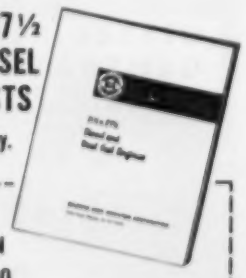

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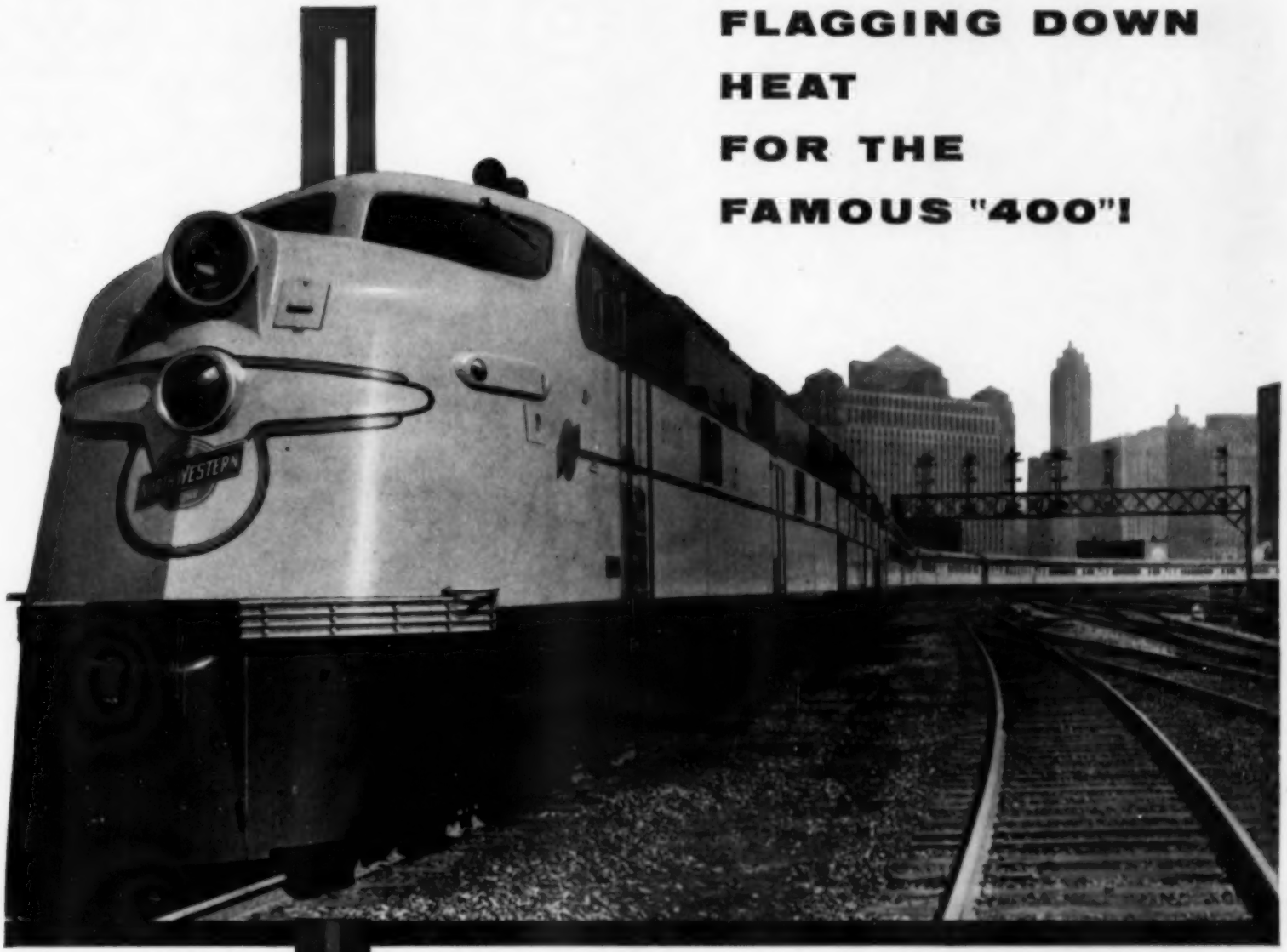

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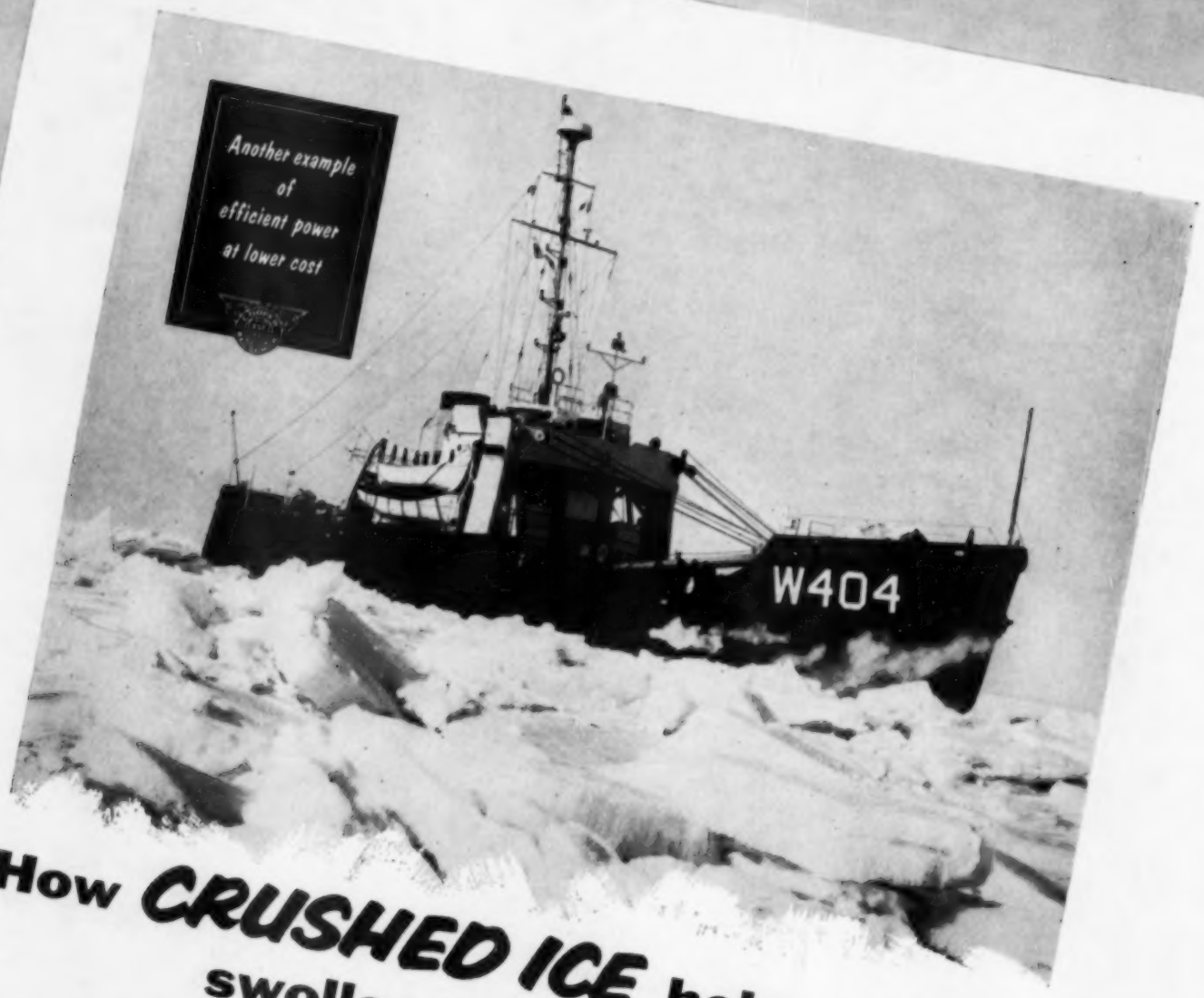


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